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PIPE LINE INDUSTRY

NOVEMBER 1957

AUTOMATIC CONTROL REPORT

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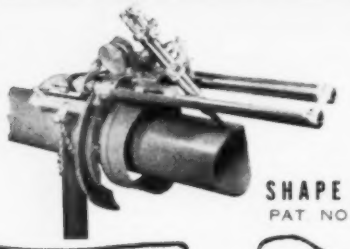
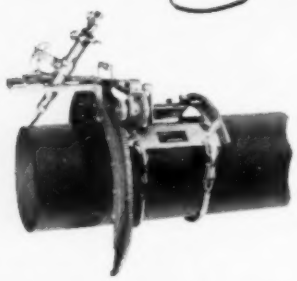


SHAPE CUTTER
PAT. NO. 2408517

a puzzle with a missing piece



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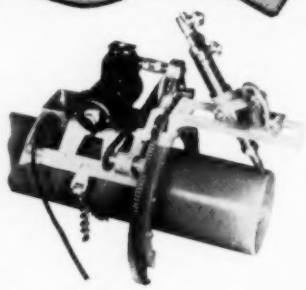

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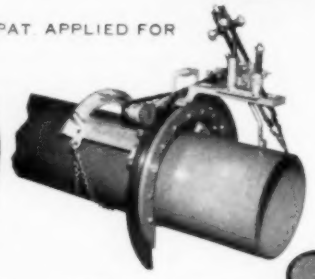

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PIPE LINE INDUSTRY

CONTENTS and Quick Look

November, 1957 Vol. 7, No. 5

To help you put first things first, scan these time-saving digests, checking ☑ those you want to read first.

AUTOMATIC CONTROL REPORT

New Look at the Little Big Inch

☐ Here is an early report on the latest ideas in metering, batch separation, and supervisory control soon to be put into service on Texas Eastern's converted products carrier. When products and LPG begin movement through the former war emergency pipe line, pipeliners will be watching operations with real interest.

By Melvin A. Judah.....Page 23

Computer Gives Dispatcher Better Forecasts

☐ How cold will be the winter of 1957-58? Forecasts based on data compiled by an electronic computer indicated it will be colder than last year. Such information can aid gas companies in scheduling withdrawals from storage areas. During six months of testing last winter, accuracies of better than 95 percent were experienced .....Page 29

Automation in Future Pipe Lines

☐ Presently available techniques and equipment could provide a completely automatic pipe line system. In the future, the dispatcher's only duty may be that of feeding or "monitoring" necessary line conditions into a computer. An "electronic brain" would then handle detailed sequence of control functions.

By E. B. Turner.....Page 30

How Sun Blends Butane Automatically

☐ Products are received at four truck unloading positions or ten tank car stations, transferred to storage, and blended into a 7000-barrel per hour crude stream by remote control. Initial operation of the new system at Sun Oil Company's Nederland (Texas) terminal has proved both feasible and economical.....Page 34

What's in the Future for LACT?

☐ Further development of lease automatic custody transfer is limited mainly by economics. With present costs, only large leases will show payout. Mass production should bring price down. First general use of LACT likely will be for new leases or leases in isolated locations.

By John C. Watts.....Page 39

Experience Proves Unattended Station Design

☐ Standard Oil Company of California's Los Banos station was converted to remote operation after seven years of service. Low maintenance costs and high performance record have confirmed engineers' confidence in its design features. Regular preventive maintenance and a close watch of telemetered data to spot impending trouble have produced a top operating record.

By F. R. Rippingham and R. U. White...Page 44

We Hope It Will Help

THE 86TH CONGRESS will be a momentous session for the natural gas industry. The final decision on the Harris-O'Hara Bill will be made, and therein lie two important questions:

What will happen to the natural gas industry if the bill is not passed?

What effect will it have on the individual consumer?

Gulf Publishing Company has spent several months checking every available source to find the answers to these questions. The results of our efforts are contained in the eight-page natural gas booklet included with this issue.

As you will see, the booklet has been prepared for distribution to the individual consumer. It is written in language the consumer will readily understand, with the object in mind that he may be prompted to help the natural gas industry in its legislative efforts.

After you have finished reading the booklet, you will be doing your industry a service by passing it on to a friend or neighbor.

Do You Deserve a Promotion?

☐ Selecting the best man for promotion is a tough responsibility in any pipe line operation. To make the job a little easier, an industry-wide survey was made to determine the most representative factors employed in evaluating personnel. For the result, a composite list of 50 "plus" personality traits, turn to.....Page 49

Getting the Word Around

☐ Northern Natural is winning many new friends within and outside the company through carefully planned use of 12 communications channels. Its latest idea, the Daily Condensation of Clippings, keeps company leaders up on day-to-day happenings throughout the company's operations area.

By James J. Finnegan.....Page 52

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PIPE LINE INDUSTRY published every month. Entered as second class mail matter July 9, 1954, at the post office at Houston, Texas, under the act of March 3, 1879.

The Natural Gas Bill

. . . the Industry and the Consumer

Natural gas producers will never forget June 7, 1954. That was their judgment day. That was the day the Supreme Court, by a split 5 to 3 decision, said in effect:

"You are a public utility. As such, you can no longer compete for a fair market price. The Federal Power Commission now has authority to control your prices at the wellhead."

Some time after the 86th Congress convenes in January, the Supreme Court ruling will be at least partly nullified—if the Harris-O'Hara Bill is passed. The natural gas producers' second judgment will come when that decision is reached.

The Harris-O'Hara Bill is far from providing the freedom producers need. It will still give the FPC authority to establish market prices of gas at the point of production. However, it will relieve the producers from stifling price controls based on cost-plus which had previously been considered. It is a step in the right direction.

With so much at stake, it stands to reason that each oil and gas employe should exert every effort within the bounds of discretion to see that corrective legislation is passed. The job ahead is aptly described by L. F. McCollum, president of the Continental Oil Company:

"Our job is to let Mr. and Mrs. America know what federal regulation of field gas prices will mean to them—not in technical or legal terms, but in terms of their own everyday experiences.

". . . When we talk to the American public—that means those who are now gas consumers and those others who would like to be—we must *accentuate the position of the consumers,* lest we lose their interest. We must give them the facts as to what will be the real effects on their lives of federal control over field prices of natural gas.

"*We must actively enlist public support for legislation that will assure the continuation of the essential services rendered to the public by the vast natural gas industry.*"

In keeping with Mr. McCollum's thoughts, The Gulf Publishing Company has prepared a special eight-page supplement, a copy of which is included in this issue. It has been prepared as an aid to the industry—to provide you with all the facts concerning the Harris-O'Hara Bill in terms the individual consumer will understand. We sincerely hope it will be of help to you.

As a part of its contribution, The Gulf Publishing Company is sending a copy to each senator and congressman.

If every employe in the oil and gas industry will pass one copy of this supplement on to a friend or neighbor, the industry can win many new friends. Some of your friends may become interested enough to let their senators and congressmen know how they feel about keeping industry free of federal control.

To make such an effort possible, The Gulf Publishing Company is offering reprints of the supplement to the oil and gas industry for the cost of printing. The prices are: Under 100 reprints, 10 cents each; 100 to 1000, 7½ cents each; 1000 to 10,000, 5 cents; 10,000 to 20,000, 4½ cents; over 20,000, 4 cents.

You may place orders by writing to The Gulf Publishing Company, Post Office Box 2608, Houston 1, Texas.

Here is *your* chance to help *your* industry. Let's all *"actively enlist public support for legislation that will assure the continuation of the essential services rendered to the public by the natural gas industry."*

If everyone will pitch in and do his part, there is a chance the next judgment day will be a happy one.

THE "OILWELL" DGE-250 GAS COMPRESSOR

is a compact, packaged, slow-speed unit!

What's the advantage of a "packaged" unit?

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The "Oilwell" Model DGE-250, shown above, is a two-stage gas compressor being used in a gas-lift operation in South Texas. It is rated at 75 psig intake and 1,200 psig discharge pressures. Its capacity is estimated at 1,565,000 cu. ft. of gas per 24 hours at a compressor speed of 275 rpm. This unit is provided with inlet and interstage mist-extractor vessels, traps, and safety-float switches.

Cooling is by means of a compact, up-draft tube-and-fin radiator. It is constructed with four separate sections for: (1) engine jacket; (2) compressor cylinders; (3) interstage gas; and (4) gas after cooling.

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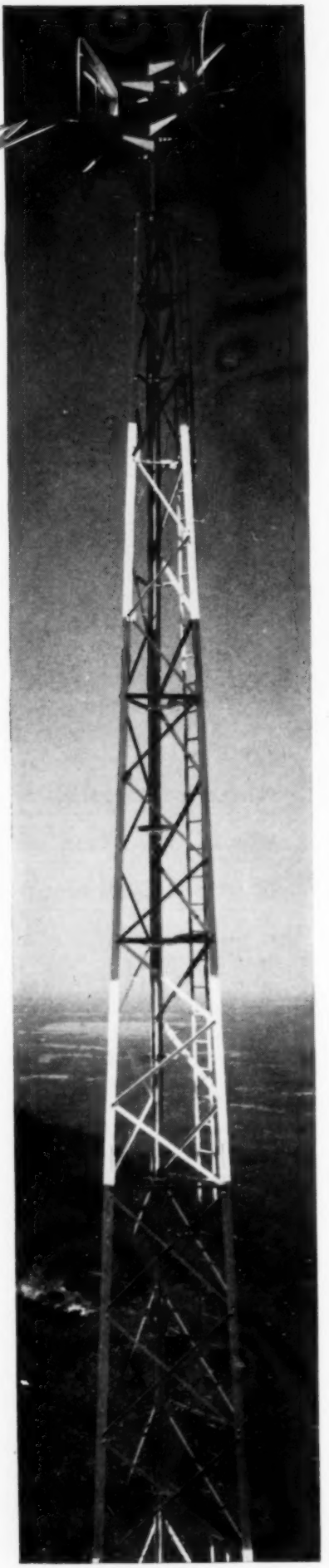

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PIPE LINE INDUSTRY and the PIPE LINE COMPOSITE CATALOG for the oil and gas pipe line industry.

WORLD OIL and THE COMPOSITE CATALOG for the drilling-producing-pipe line industry.

PETROLEUM REFINER and THE REFINERY CATALOG for the refining-natural gasoline-petrochemical industry.

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Indexed by Engineering Index and Industrial Arts Index

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Young equipment identified above: (1) Radiator Model MWC-455 with separate cooling sections for jacket water-supercharger intercooler water and engine oil. (2) Young Mono Weld ® construction turbo-charged air intercooler. (3) Model OCS-300 Torque Converter Cooler.

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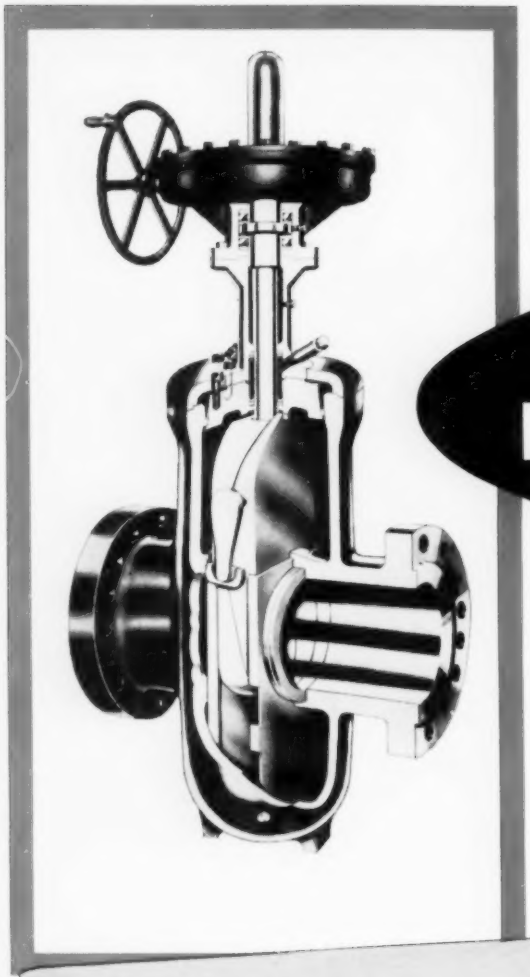

Selecting Pipeline Valves?

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Selecting the right valve for mainlines, loops, gathering lines, compressor stations, or wherever you need them on the system is easy when you turn to the W-K-M Section in the PIPE LINE COMPOSITE CATALOG.

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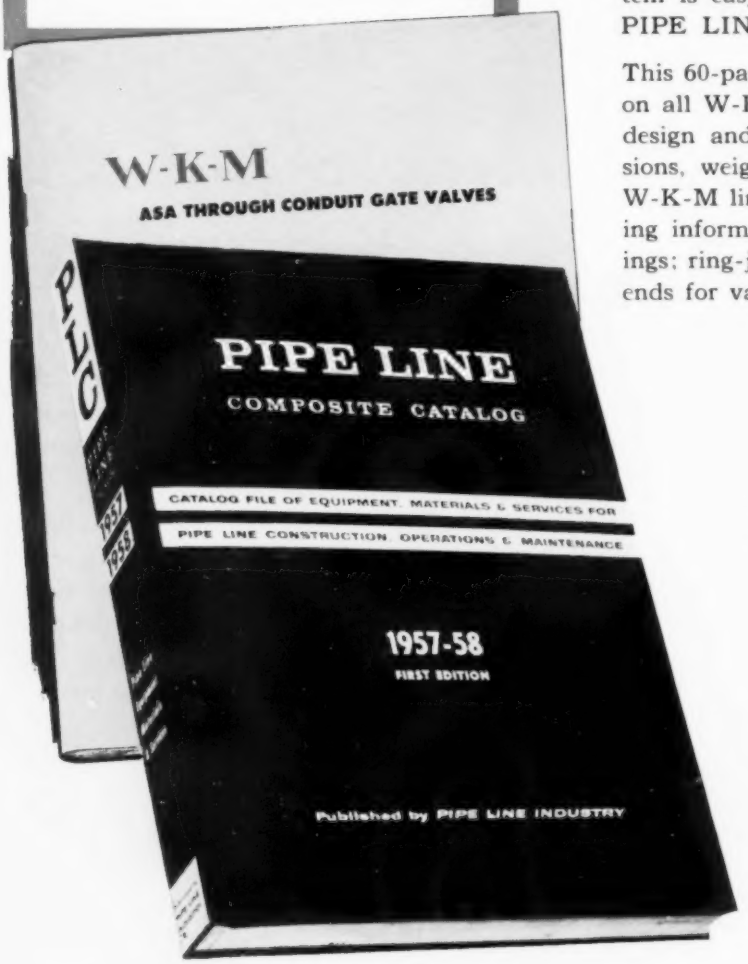

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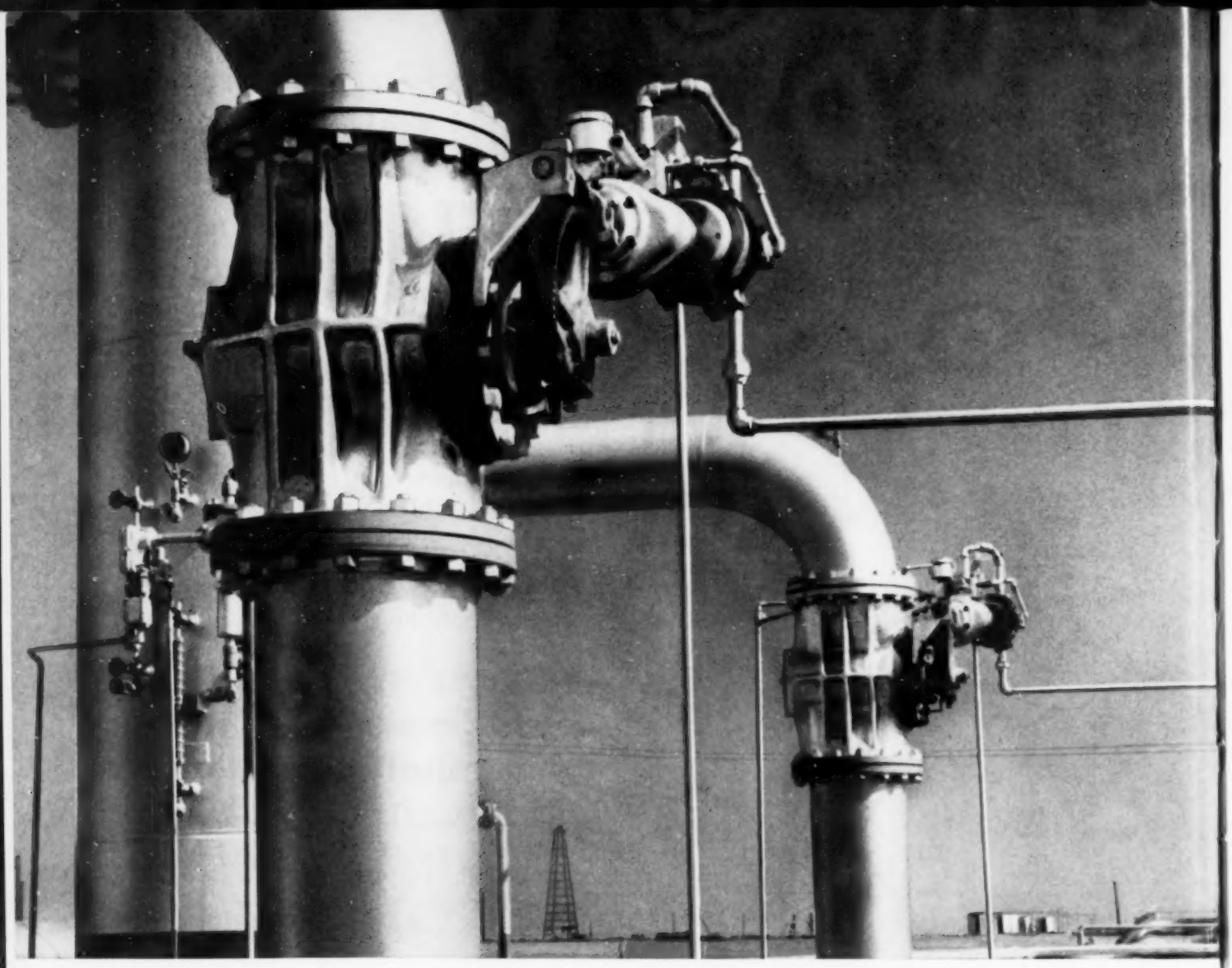

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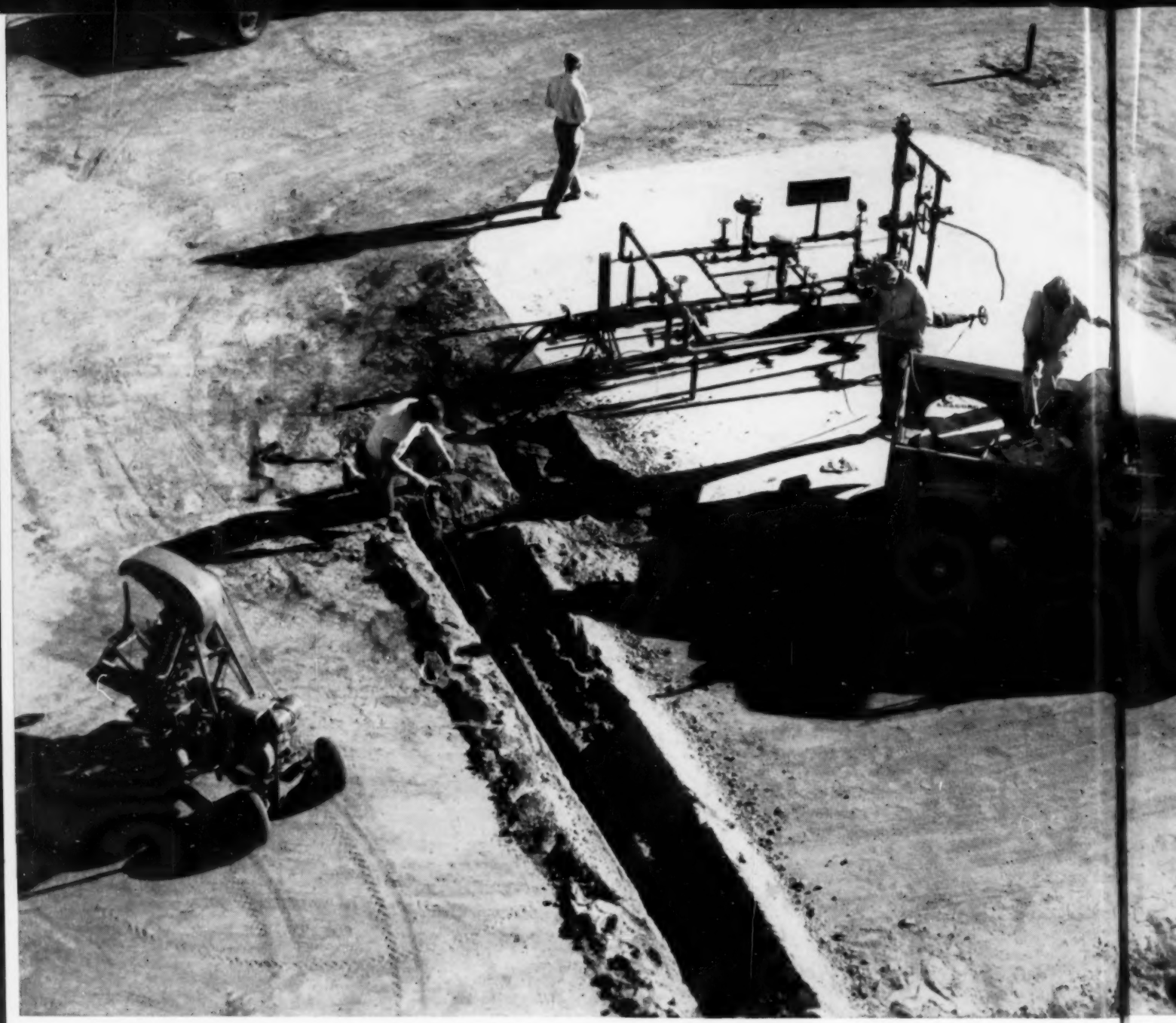


Anaconda Type CP Cable is laid in trench to oil well casing to be protected by cathodic protection. Continental's entire 163-well lease at Ventura, Calif., has been protected with a CP system.

Oil company checks oil well casing corrosion for less than the cost of 3 casing failures—with CP

Anaconda's special Type CP Cable is used throughout.

The corrosion problem at Continental's 163-well lease at Ventura, Calif., was pretty typical: 15 casing failures in 3 years. Cost of repairs – from $22,000 to $61,000 a well – averaging about $125,000 a year for the 3 years that corrosion has been a serious problem.

In May, 1954, Continental engineers began investigating cathodic protection to protect oil well casings. One well was set up with cathodic protection – and after six months, a visual examination and an electrical survey showed a definite lessening of corrosion potentials.

Last year, cathodic protection was expanded to all 163 wells—the first time an entire lease has been protected against corrosion of oil well casings by CP. The cost: $109,000—less than the cost of 3 casing failures.

Heart of the CP system is 49,000 feet of Anaconda's Type CP Cable. Designed *especially* for cathodic protection, Type CP Cable promises longer cable life because of resistance to oil, soil acids, and electroendosmosis.

The Man from Anaconda will be glad to give you more information on cathodic protection for oil well casings and other metal products—as well as complete data on Anaconda Type CP Cable. Call or write today: Anaconda Wire & Cable Company, 25 Broadway, New York 4, N. Y.

SEE THE MAN FROM **ANACONDA**®

(above, right)

Three anodes—3-by-60-inch shafts of graphite—were used for each casing, buried 10 to 15 feet apart and 11 to 30 feet deep. When wells were grouped, the number in the common field was cut. Here, one worker prepares to lower anode in hole while second man holds bag of carbon coke.

(middle, right)

After ditch-digging machine carved out 18-inch trench, Anaconda's special Type CP Cable was buried in the ditch, connecting the rectifier on base of power pole to anode bed and well head. In some nearly vertical areas, cable could not be buried—but Anaconda's tough Densheath* jacket protects it from sun, wind and rain.

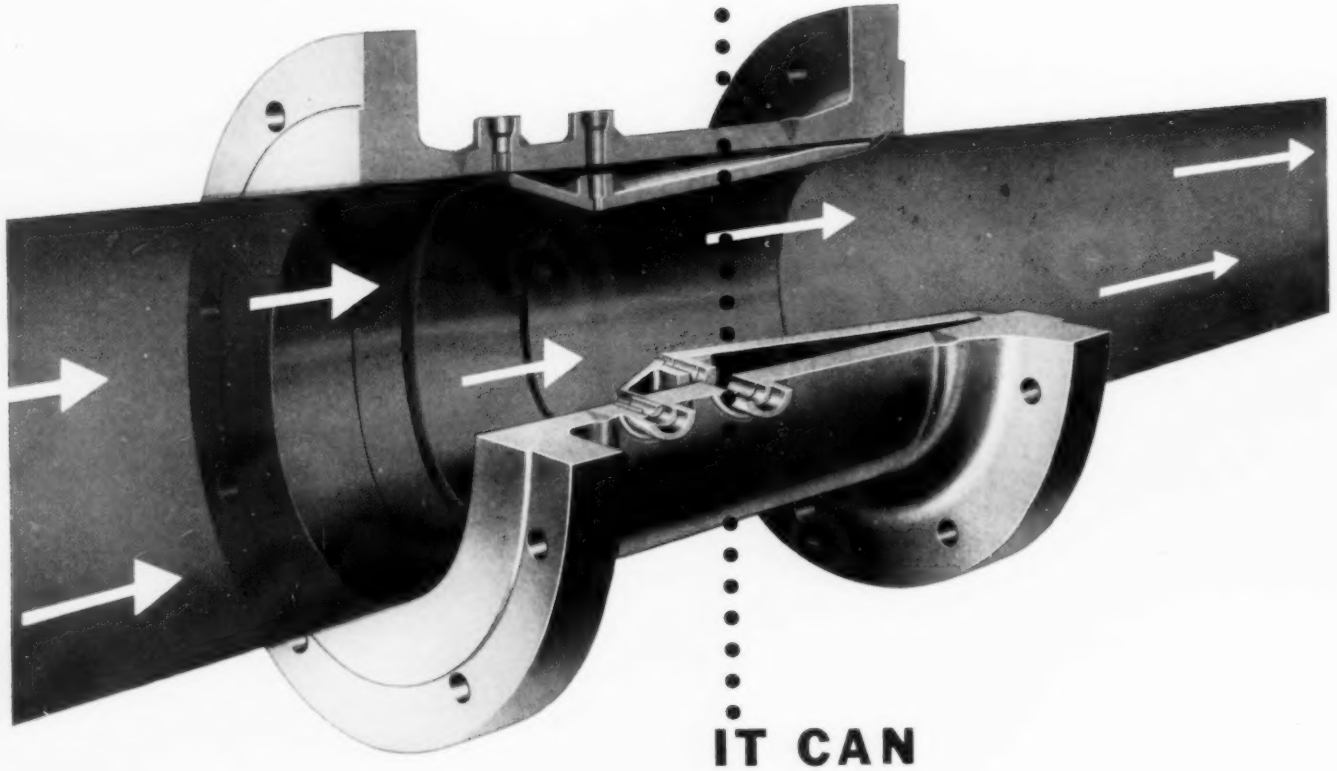
(bottom, right)

Final Step — juice from overhead lines was connected to the CP system.

*Reg. U. S. Pat. Off.

for Type CP Cable

DON'T LOSE YOUR HEAD



IT CAN PROVE COSTLY!!!

The Dall Flow Tube operates with the lowest head loss obtainable with any known velocity-increasing differential producer. This flow measuring device is unsurpassed for differential pressure recovery . . . with consequent savings in pumping and transmission costs. These advantages apply over a full range of throat-to-line diameter ratios. Besides providing a maximum in power savings, additional savings can be realized at initial installations. A single Dall Flow Tube can replace several parallel large orifice runs requiring longer approach sections of straight pipe.

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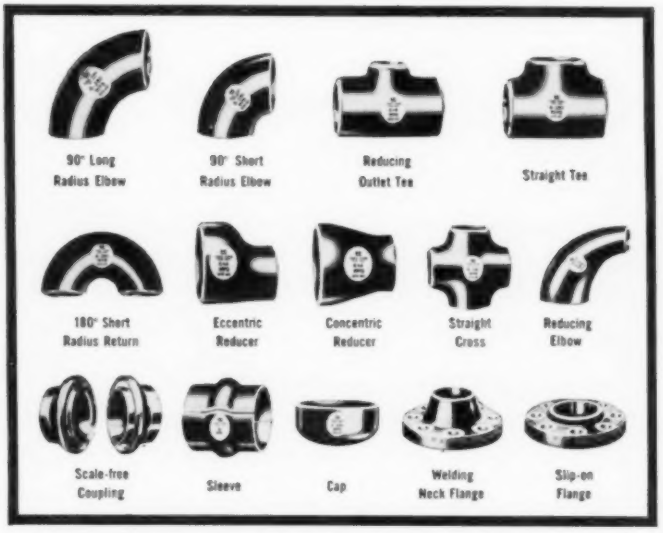
Request Technical Bulletin 115-DM1 which contains charts, graphs, and data of special interest to design engineers. Write Builders-Providence, Inc., 545 Harris Ave., Providence 1, Rhode Island.

You get

FAST DELIVERY

from the world's most complete line of pipeline fittings



12,000 ITEMS. All types of welding fittings and flanges . . . sizes . . . schedules . . . yield strengths . . . materials to match your needs. Pipeline fittings 16" through 42" described in Catalog TT 638.

LARGE OR SMALL. Carbon steel fittings and flanges as large as this 42" elbow . . . or as small as ½". Lightweight fittings for gas distribution lines are available in sizes of 4" through 24".

SPECIALS. Tube Turns supplies venturi reducers (A) and manifold fittings (B) for valve installations such as shown. Also anchor forgings, full encirclement saddles, odd angle elbows and other pipeline special fittings.

YOUR NEARBY DISTRIBUTOR provides this complete line service. You can order standard and special TUBE-TURN* products from him . . . all on one order . . . and cut purchasing red tape.

TUBE-TURN

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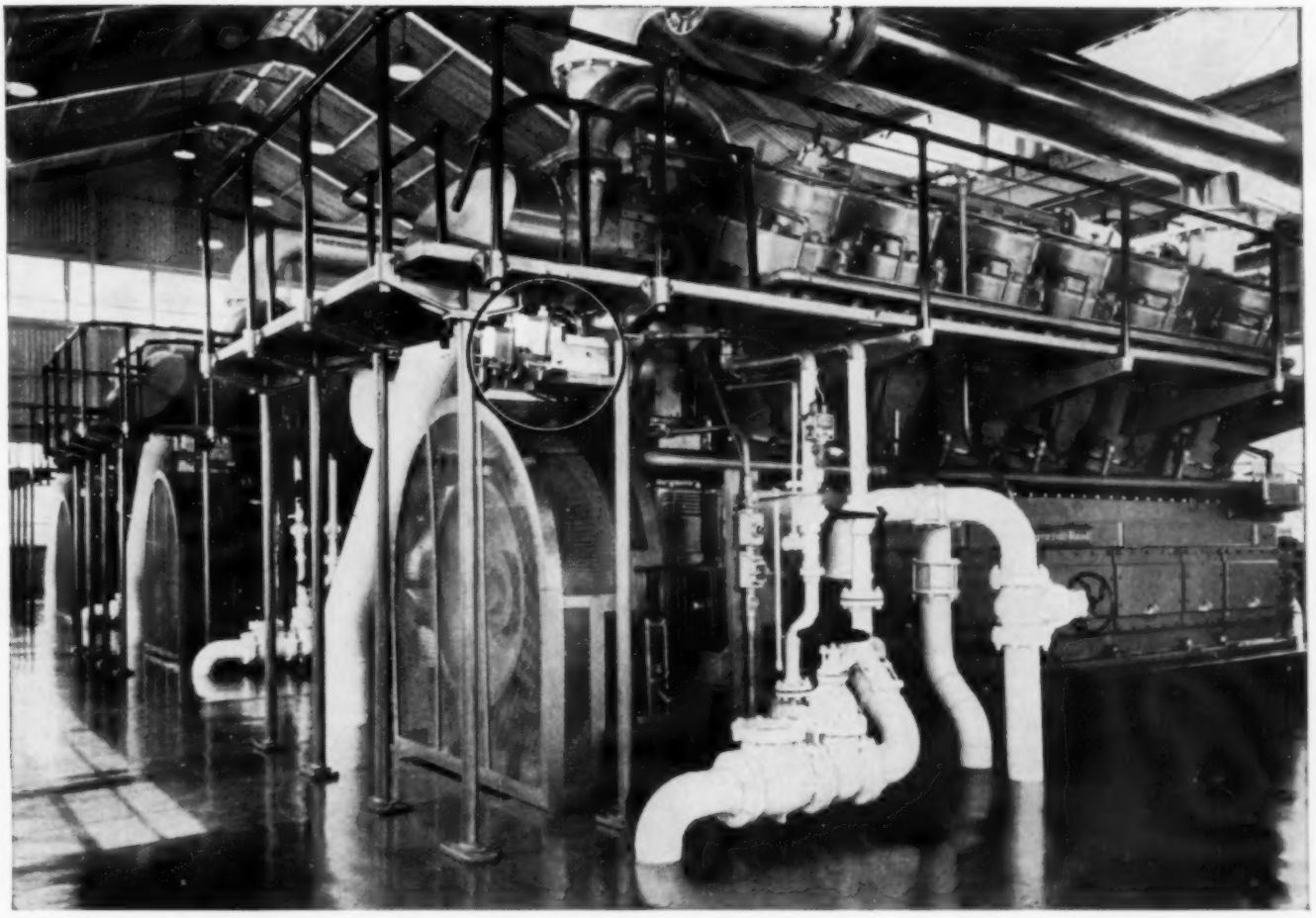
LUBRICATED PLUG VALVES by WALWORTH

Two Walworth Cast Steel Lubricated Plug Valves in use on the main line of a southeastern gas pipeline.

In addition to Lubricated Plug Valves, Walworth manufactures Gate, Globe, Angle, and Check Valves in a wide range of types and sizes for the oil and gas industries. Walworth Company, General Offices, 60 East 42nd Street, New York 17, N. Y.

DISTRIBUTORS IN PRINCIPAL CENTERS THROUGHOUT THE WORLD



SERVING TRUNKLINE GAS COMPANY OF HOUSTON —A VITAL LINK IN THE NATION'S ECONOMY!

Matched Ignition System

Hi-V Coil

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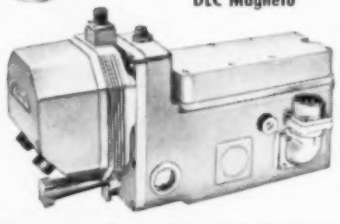

Trunkline Gas Company of Houston, Texas, operates a natural gas transmission line extending from near McAllen, Texas, to Tuscola in central Illinois where it connects with the line of the Panhandle Eastern Company.

This gas line crosses Texas, Louisiana, Arkansas, Mississippi, Tennessee, Kentucky, and the southern half of Illinois —a vital link in the nation's economy.

Helping to serve this very important segment of the nation's natural gas transmission system is the battery of Ingersoll-Rand 412 KVS engines equipped with Bendix DLC6 magnetos and Bendix HI-V transformer coils (illustrated at left) in Trunkline's Cypress Compressor Station near Houston.

The Bendix DLC6 magneto is a completely new type of magneto, incorporating the latest engineering design. Together with the Bendix HI-V transformer coil it becomes a matched ignition system that delivers more than ample voltage with greatly reduced maintenance cost.

SCINTILLA DIVISION OF BENDIX AVIATION CORPORATION, SIDNEY, N. Y.

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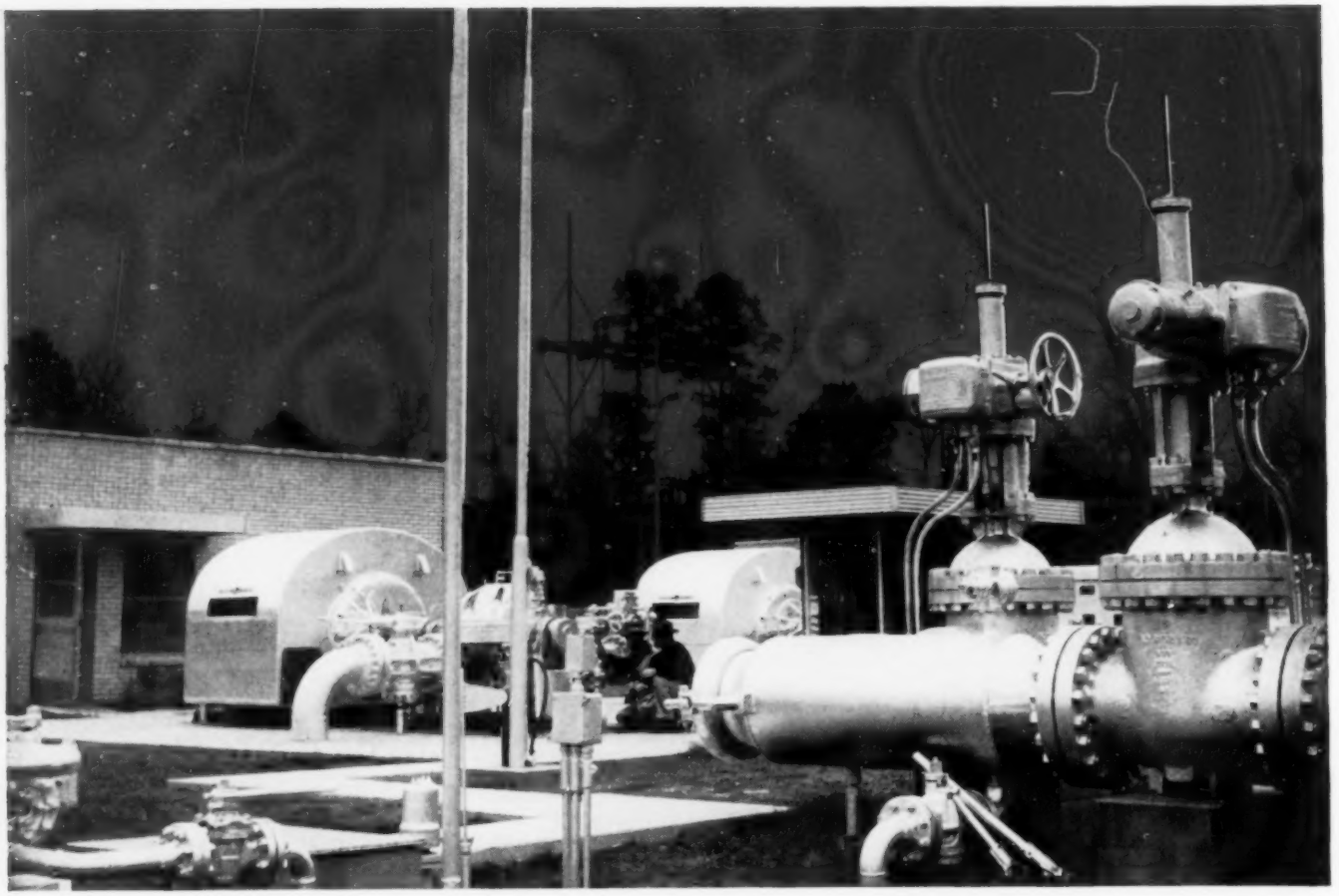
SIDNEY, N.Y.

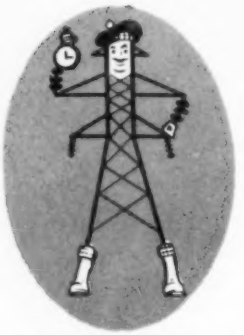
Bendix AVIATION CORPORATION

PIPE LINE PUMPING MAKES WONDERFUL CHANGE WITH ELECTRIC POWER



Operated by Remote Control

There are over 686,000 miles of pipe line throughout America today – three times the total U.S. railroad trackage. Reason for this big boom is economy of transportation. Closely linked with the economy picture is UTILITY ELECTRIC POWER – the power that has made push-button, fully automatic pipe line operation possible. When you have deliveries to make on schedule – at low cost – without the usual worries of station down-time, etc. – USE UTILITY ELECTRIC POWER. It's the sure way to be modern, more progressive and make more money.



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PETROLEUM ELECTRIC POWER ASSOCIATION

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PIPE LINE PANORAMA

Internally Coated Pipe Pays Off . . . After two-year efficiency study of pipe internally coated at the mill, Transcontinental Gas reports: Internally coated pipe is 12 percent more efficient than unprotected pipe stored 6 to 24 months. Result: Transco is internally coating all pipe used in its looping program during '57.

More Railroads in Pipelining? . . . If feasibility study by Williams Brothers proves favorable, two more leading railroads may become pipe line operators. According to the plan, Katy (Missouri-Kansas-Texas) and New York Central systems would build 2000-mile, 10 or 12-inch LPG system from Houston to the Midwest and New York.

Project spotlights two growing developments: Long haul pipelining of LPG's, and more interest in pipe line operations by railroads.

Pipeliners Take to the Airwaves . . . Reason for current oil and gas industry battle before Federal Communications Commission for adequate frequency allocations was clearly outlined at St. Louis AGA meeting. API's Joseph Keller reported gas pipe lines have 11,000 miles of microwave installations now in operation—and are proposing to more than double their mileage and investment in near future.

Needed, says Keller: Still more gas pipe line support of groups representing industry before FCC.

Crude Lines Answer Antitrust Charges . . . Government antitrust probe of oil pipe line companies is moving into high gear. Already, motions have been filed against six companies. And more charges are predicted. This is first time Justice Department has sought to test any provision of 16-year-old decree.

Current probe concerns alleged oil pipe line violations of 1941 consent decree restricting companies that own pipe lines and ship oil through their own facilities to 7 percent profit. Base used for figuring return is object of probe. Companies have lost no time in presenting strong answers to the charges.

Will Turkey Build the "Big One"? . . . With three big "ifs," the Shah of Iran says he will seek his parliament's permission to sign pipe line agreement with American investment interests. Proposed line would carry crude from Alborz field in Qum area, 1000 miles across Turkey to Mediterranean.

The Three Big "Ifs": Reserves, markets and the Mid-East turmoil. Final decision hinges on whether Alborz field has enough reserves to quench thirst of huge line over long period—and whether adequate markets can be found.

Midwest Gas Contest Moves Forward . . . FPC has taken initial step toward deciding who will deliver additional natural gas to lucrative Chicago-Midwest market. Under heavy fire since last January (strong protest was from TGT and subsidiary, Midwestern Gas Transmission), proposal by five gas pipe line companies to serve the heavily populated area has finally received FPC examiner's blessing.

Expansion plans call for construction which will increase deliveries 485,000 Mcf per day, mainly to Chicago area. Cost: $182 million. Companies involved: Natural Gas Pipe Line, Texas Illinois Gas Pipe Line, Chicago District Pipe Line, Pacific Northwest and Colorado Interstate.

RAY L. DUDLEY 1891 – 1957

RAY L. DUDLEY, internationally known pioneer oil publisher, who headed the largest petroleum publishing house and the largest printing company in the southwest, died at his home in Houston on the afternoon of Tuesday, October 29.

President of Gulf Publishing Company, Mr. Dudley was the founder and publisher of WORLD OIL, PETROLEUM REFINER, and PIPE LINE INDUSTRY magazines, as well as Composite Catalogs for three branches of the oil industry. He also was chairman of the board of Gulf Printing Company.

His dynamic personality, zeal for accurate and forceful reporting, and burning desire to improve not only the publications but the oil industry in general—are reflected in the editorial character of the pages published under his direction over a full 40-year span, and will continue to be an inspiration to his organizations.

Mr. Dudley's enthusiasm and untiring energy must be given credit for the growth of the two companies into leading publishing and printing firms. He inspired and supervised this growth. It was with great satisfaction in his later years that he saw them firmly established with a future even more resplendent than he himself had yet witnessed.

From his earliest days as a newspaper reporter, Mr. Dudley displayed a fearlessness that distinguished his activity. He had his own thoughts on most questions and was outspoken with them. This characteristic, together with his personality and worldwide acquaintance in oil circles, made him a spokesman for the oil industry for many years.

His was a colorful, picturesque career, and it is easy for his associates and acquaintances to think of Ray Dudley as "an oil industry tradition" whose name will be linked with events and anecdotes about oil for years to come. Truly he created a place for himself and his publications.

Enthusiasm was another word for Ray Dudley. His heart, as his friends know, faltered on several occasions during the past decade and various other ailments slowed him down. But he never lost his desire to be up and about and doing things.

Looking ahead to the future, Mr. Dudley some years ago set up an Advisory Committee comprising other Gulf Publishing Company officials and department heads. He saw that this committee had a firm grasp on company affairs, so it would be prepared to carry on the activity of his beloved publications.

Ray Lofton Dudley, school teacher, newspaper reporter, editor, publisher, and business executive, was born in Denton County, Texas, August 8, 1891. His first oil industry connection came in 1916 with *Gulf Coast Oil News*. This periodical became *The Oil Weekly*, and then WORLD OIL in 1947. In 1922, Mr. Dudley founded PETROLEUM REFINER. Five years later, the Composite Catalog of Oil Field Equipment was started, and now is published in three volumes with more than 5000 pages. The Refinery Catalog appeared in 1933. In 1954, PIPE LINE INDUSTRY magazine was started for the pipe line branch of the petroleum industry. The Pipe Line Composite Catalog was issued for the first time in August, 1957.

Mr. Dudley was a past director of the American Petroleum Institute, a director of the Texas Mid-Continent Oil & Gas Association, and one of the founders and past president and national regent of NOMADS. In addition his list of civic activities was long and distinguished.

Mr. Dudley is survived by his wife, Frederica Gross Dudley; a son, William G. Dudley of Houston, and a daughter, Mrs. John E. Cashman of Beaumont. Two of the Dudley sons died in the service during World War II.

Funeral services were held at the Dudley home on October 31 and interment was in Houston.

Pipe Line Industry's 1957 Report on Automatic Control Advancements

Texas Eastern's converted products line will pick up shipments from the Baytown-Beaumont, Texas, and El Dorado, Ark., and Mid-Continent refining areas for delivery to Midwest and Ohio Valley markets. Main line stations are electrically powered centrifugals operated remotely by means of a new supervisory control system.

New Look on the Little Big Inch

Texas Eastern's converted products line features innovations that would have been only dreams on the original war emergency line.

These latest ideas in batch separation, metering, and controls will be watched closely.

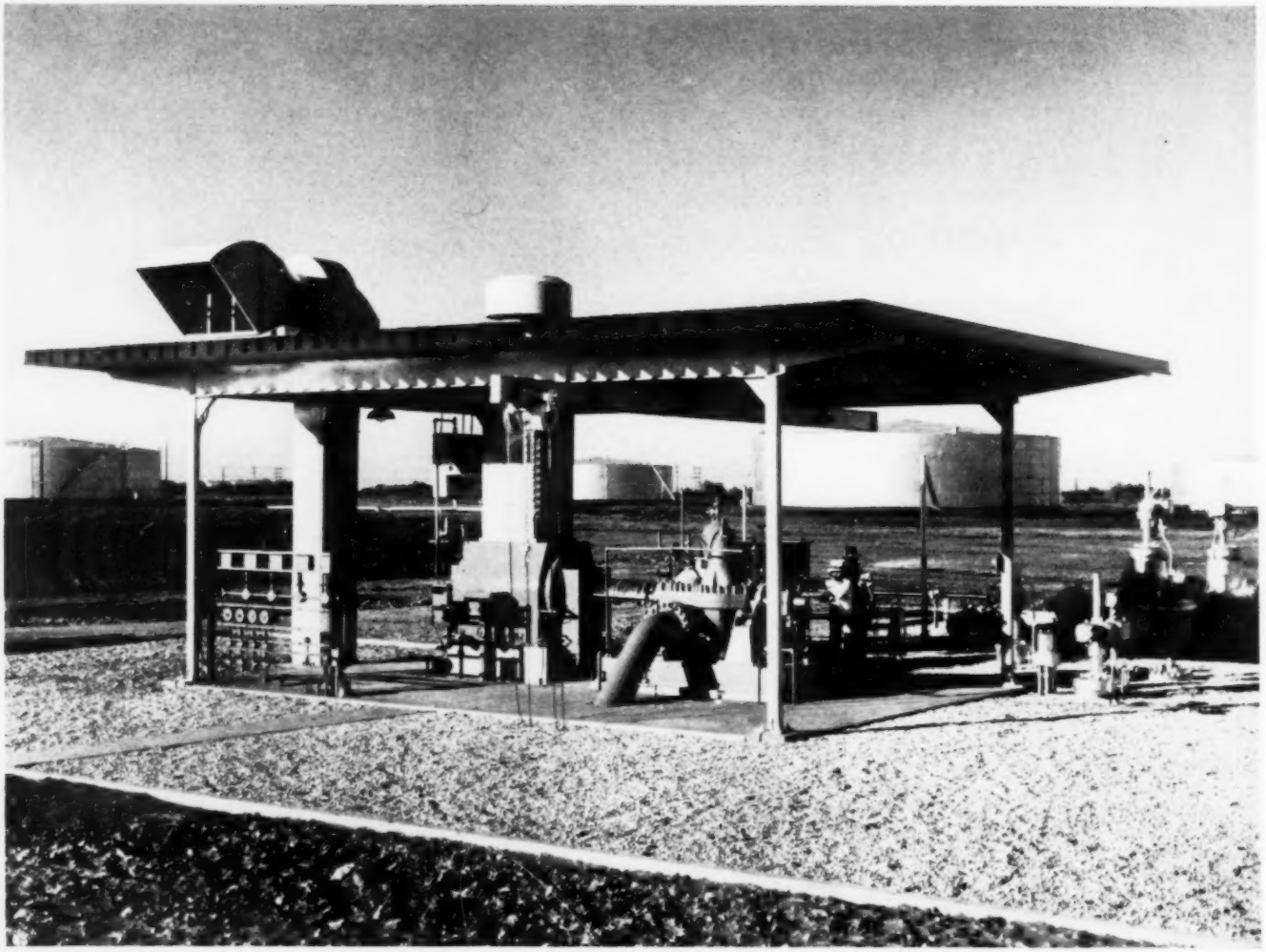
WHEN the pipe line that made history as a "War Baby" returns to its original duty upon completion of conversion it will have a host of new engineering features added. New PD meter banks, line displacement proving loops, "umbrella" tank batch shifting, and a new supervisory control system on Texas Eastern Transmission Corporation's converted products line bear little resemblance to the original war emergency pipe line built by Burt Hull and "his boys".

The 1168-mile, 20-inch trunk which did a big job in support of military and industrial fuel needs during the war will soon be handling products again. Since purchasing the line in 1947, Texas Eastern had operated it as a gas transmission line until receiving FPC authorization to shift it to products.

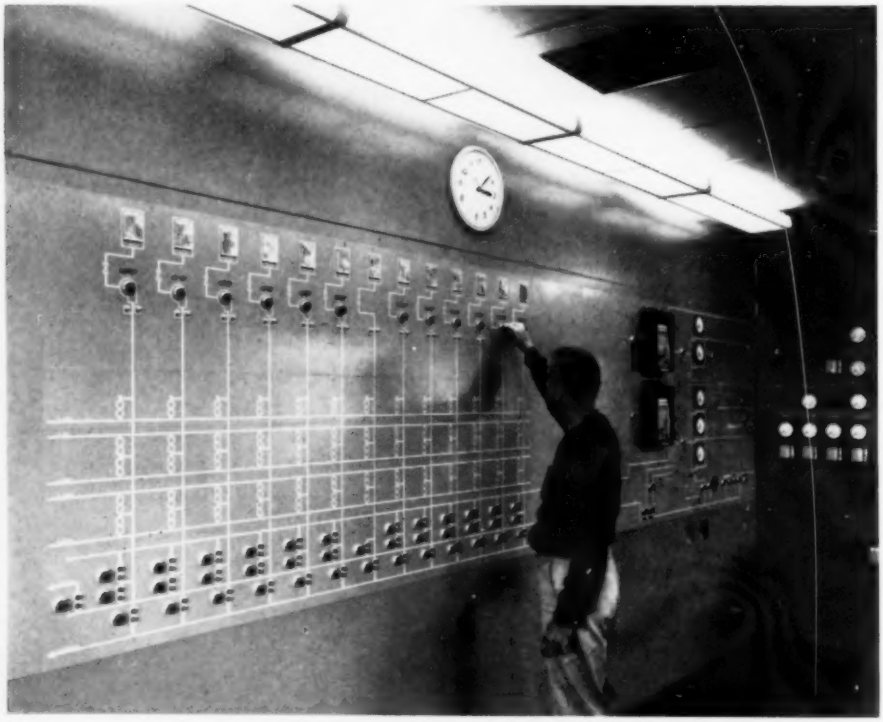
Stretching from Baytown, Texas, through the Beaumont refining area and on up through Louisiana, Arkansas, Missouri, Illinois, Indiana and Ohio to Moundsville, W. Va., the converted line will handle shipments of aviation and motor gasolines, jet fuel, tractor and diesel fuel, distillate fuel oil, No. 1 and 2 burner oil, and LPG. Initial maximum capacity will be some 185,000 barrels per day. Original tankage of some 3 million barrels was boosted to about 4.4 million during conversion. Returning the Little Big-Inch to products service called for an outlay of more than $35 million by Texas Eastern. Line fill will amount to some 2 million barrels.

To deliver products into the Chicago area from a take off point at Seymour, Ind., Texas Eastern laid a new 14-inch line completed early this fall.

At the southern terminals of the line, sufficient collection tanks are



This 2000-hp, two-stage centrifugal pump-electric motor unit at Beaumont is typical of station design on the system. Main line pump is rated at 5367 gpm at 1770-foot head and 3750 rpm. A 450-hp booster unit delivers product to suction side of main line pump.



Control panel of the El Dorado, Arkansas station displays flow through manifold, gate valve settings, suction and discharge pressures, and continuous gravitometer readings.

available at Baytown and Beaumont to receive products from a number of shippers and maintain the integrity of a variety of products. All products will be received by positive displacement meters and also delivered on metered volumes.

In operation, the 60 miles of 16-inch between Baytown and Beaumont will in effect serve as a feeder line. Excess line capacity between the two points may be used as "storage" by the dispatcher.

Maintaining Batch Separation at Full Flow. All tankage at Beaumont is equipped to "drain dry" to the suction side of a booster pump that delivers into a 10,000-barrel floating roof surge tank. About an hour and 20 minutes pumping time is required to empty the surge tank at full main line flow; this enables a shift of batches without slowing down main line

movements. Roof of the surge tank nests on the "hopper bottom." Accurate interface control is achieved by means of a 15-second valve operator on the surge tank discharge line. Just as the roof touches the bottom, control is switched to the next batch so new product will begin to enter the surge tank from the next tank to be handled. Using the drain dry control set up, a new batch of product can also be introduced into the main line without diverting movement of the main line slug.

Control points for Texas Eastern's product system are at Beaumont, which controls stations at Newton, Texas, and Many and Castor, La.; at El Dorado, which handles stations at Fordyce, North Little Rock and the North Little Rock take-off; at McRae Junction, Ark., which controls stations at Bald Knob, Egypt, and Fagus, Ark., Oran, Mo., and delivery to Cape Girardeau, Mo.; at Lick Creek, Ill., which controls stations at Norris City, Ill., Princeton and French Lick, Ind. plus the Princeton take-off and delivery to Station 14 at Seymour, Ind. Seymour will control stations at Batesville, Ind., Lebanon, Circleville, Somerset, and Summerfield, Ohio, plus operation of the Chicago lateral as an independent line. At Seymour, there are eight tanks for breakout storage serving the 14-inch Chicago spur from the 20-inch main line.

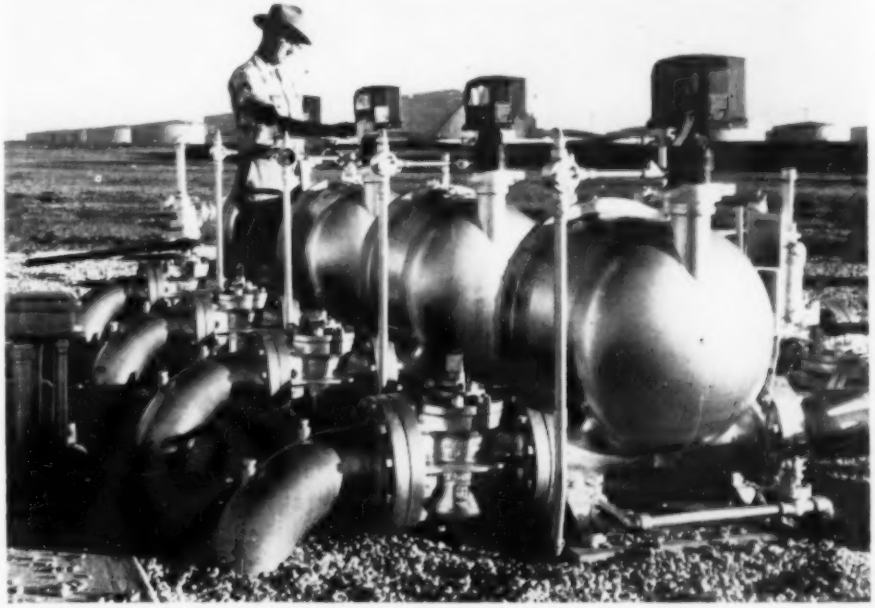
Manifold Design Minimizes Contamination. All manifolding is designed for compactness, eliminating as many contamination pockets as possible. All stations pass scrapers automatically by means of a mechanical scraper trip and control system. Stations on the converted products carrier are only "partially attended".

PD Meters Used Throughout. All products will be received and delivered by positive displacement metered volumes taken from multiple unit banks both on incoming and outgoing manifolds. The Beaumont meter system is a good example.

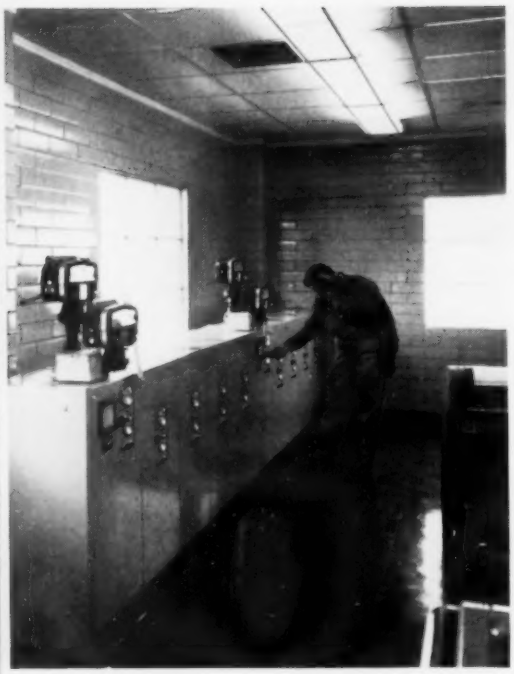
There are six meters on the incoming lines; five on 8-inch manifold lines and one on a 6-inch. There are four 2500-barrel per hour meters on the outgoing main line manifold.

Readings transmitted electrically

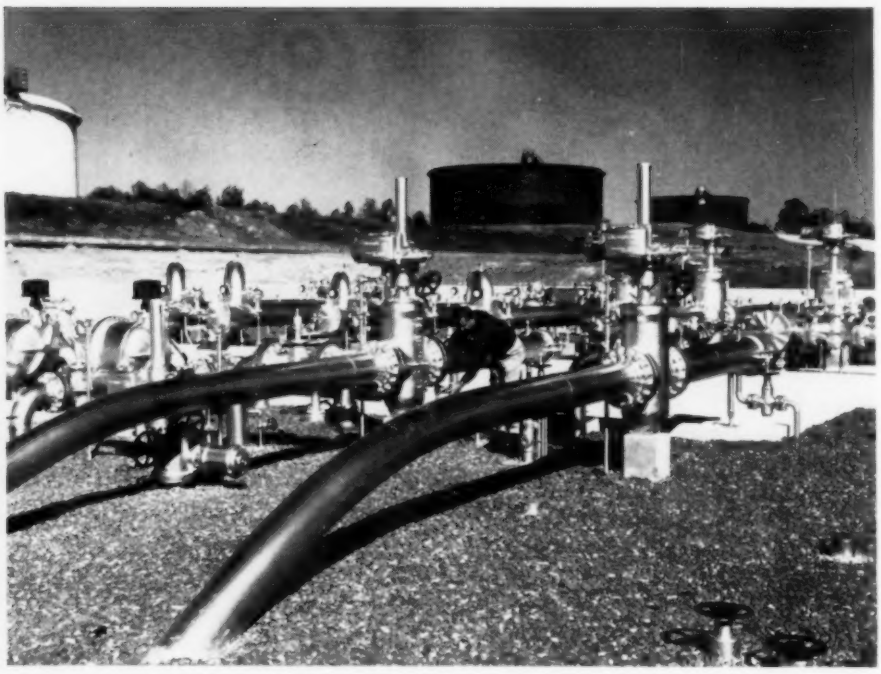
To eliminate errors resulting from accidental operation of buttons, both the button for the specific function and master operating button on the supervisory control console must be pushed at the same time. Start, stop, crash stop, station roll call, normal pressure setting, and high pressure setting (for LPG) may be made for other stations from this Beaumont console.



All products will be received and delivered by PD meter volumes throughout Texas Eastern's product system. This outgoing meter bank at Beaumont has four meters each with a capacity of 2500 barrels per hour.



Readings are transmitted from manifold meter banks to integrating console inside station. Meter correction is set in manually.



These barrels are terminal points for El Dorado station prover loop. Meter factors throughout the system will be obtained by pipe line displacement method. Adjacent barrels save work in sending and retrieving scrapers during meter tests.

Neoprene ball squeegee is inserted into the 2000-foot, 10-inch prover loop at the Beaumont station. Tests with the liquid filled spheres have shown good reproducibility in proving runs.

10,000-barrel floating roof surge tank is used at Beaumont to facilitate batch separation. Tank has a "hopper" bottom on which the roof nests at instant of interface shift. Tank discharge valve has a 15 second operator for precise control.

from the meters are corrected and integrated automatically at a panel in the station control room. Recording consoles indicate the gross reading in barrels per hour; corrected meter reading, which takes into account the meter factor that is set into the integrator manually; and finally the net volume reading that includes both temperature and meter factor corrections.

Meters at all stations will be proved by the pipe line displacement method of calibration through a prover loop; the loop at Beaumont is a 2000-foot section of 10-inch. Texas Eastern will also make use of "rubber ball squeegees" for meter proving and batch separation. Early experience with the liquid filled neoprene spheres has shown very good separation with no appreciable product by-pass.

Working Tanks Are "Drain Dry."

At the Beaumont station there are 20 55,000-barrel tanks; 12 in the "drain dry" system. Products received at the Beaumont terminal pass through the strainer barrels, then through the incoming meter bank and on to storage. Outgoing shipments flow through tank boosted pumps to the suction side of the booster pump serving the surge tank.

When a batch shift is signalled, products enter the surge tank, are discharged and boosted in pressure by two centrifugal pumps in series, and

pass through the outgoing strainers and meter bank. They are then pumped on up the line by the main line booster and main line pump. If a meter is to be proved on the outgoing stream, flow is directed through the prover loop immediately before it enters the meter.

The Beaumont station has one main line pump, a two stage centrifugal rated at 5367 gpm at 1770-foot head; it is driven by a 2000-hp electric motor at 3750 rpm. Number 1 and 2 boosters from the surge tank are 250 hp pumps; the main line booster is a 450-hp unit.

All of the stations on the converted Little Inch are electrically driven centrifugals of 2000-hp rating with the exception of the four 1750-hp units at Baytown; Fagus, Ark.; Lick Creek, Ill., and Princeton, Ind. McRae Junction station is a 1250-hp receiving point.

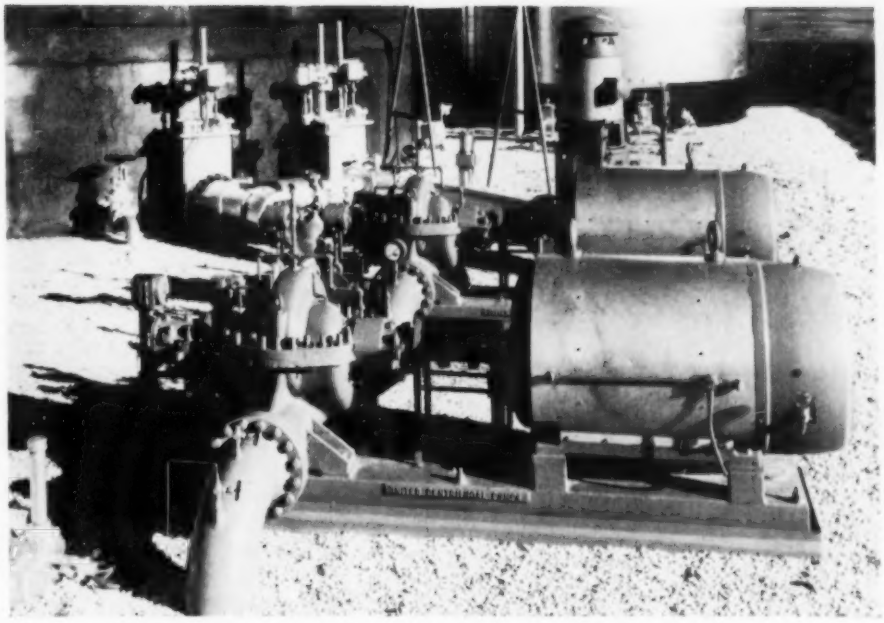
Each section within the control system can be treated as a separate unit on the Texas Eastern products line. It can be sectionalized, and control turned on or off to make for ease of control with the line filled.

New Supervisory Control Used. Control functions on the converted products carrier will be by means of a new selective supervisory system developed especially for the line; no data will be telemetered. Supervisory control functions include: start, stop, crash stop, roll call of stations, a normal suction pressure setting for products and a high suction pressure setting for LPG. The system will also indicate scraper passage by stations, and whether lateral valve positions are open or closed.

To minimize errors that might result from accidental operation of control buttons, both the individual control button and the master operating button must be operated simultaneously.

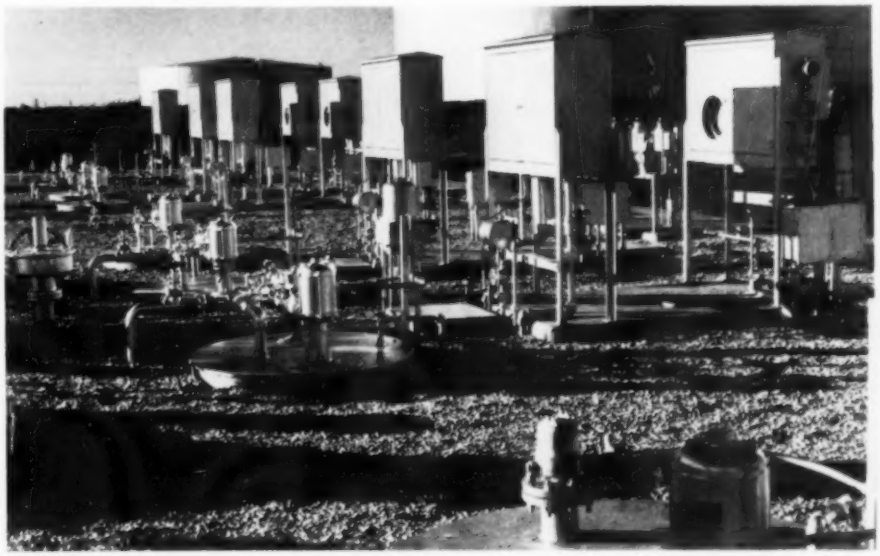
Intelligence is put into the five pulse code representing each digit by the positioning of two long pulses in the group. Codes are repeated automatically and matched to insure safe operation. The system may use either a two- or three-digit coding plan; with three digits a thousand codes are available. For equipment control only three codes are needed; one each for on, off, and test inquiry.

Colored signal lights monitor opera-



Use of two 250-hp boosters on Beaumont surge tank discharge provide precise batch shifts with minimum of contamination at full main line flow rates.

Strainer barrels at new El Dorado station. All products are filtered upon receipt and before entering PD meter banks.



Battery of recording gravitometers monitor product stream and transmit continuous readings to station control panel.

tions and indicate status of equipment. A change causes the system to automatically locate the device and show the change on the lamp signal at the control console.

Periodically, the system scans all points to verify channel continuity and pulse operations and receivers. Scanning may be started on an automatic basis at periodic intervals by an alarm signal from a remote device or manually by the control operator. A monitor station may be located anywhere along the line to provide visual indication of the status of the various devices in the system.

This supervisory control system operates over a telegraph grade channel. All signalling and control impulses are sent over one channel. Three types of supervisory control stations may be used on the system. A main control station has a control console that sends signals to satellites and also indicator lights to show equipment status. Relays are mounted in the cabinet in back of the control board. Satellite stations have cabinets containing relay equipment and only those local controls needed to maintain circuit continuity. In addition, a monitor station may also be used. Monitors enable the operator at that location to know valve settings, scraper location, and equipment status on the section of line delivering to his own facilities.

In addition to performing control operations, the supervisory control system sequentially checks the status of all devices to make sure that the lamp signals shown are correct. An inquiry code is sent to each device; a return pulse from the satellite indicates that status of the remote equipment. If they are in agreement, the test proceeds to the next device; if not, the lamp signal is changed to show the true position and flashes on and off. In addition an alarm sounds to alert the operator of the change.

The system also receives alarm signals and determines location and cause. It is particularly useful in spotting location of scrapers in sections of line. Unitized design, fail safe features and use of telegraphic quality channels promise to be of real value in the control of the "new" Little Big Inch.

—**The End**

If Oil Could Speak

If oil could speak it would have many fascinating truths to tell the non-oil public—truths that would win thousands of new friends for the oil industry.

But, oil can't speak—you can. You, as an individual, can win many new friends for the oil industry if you will pass the true facts on to your non-oil industry friends.

Here are some of those true facts. They are being presented for one purpose: To keep you posted on your industry, so you can tell the story oil is unable to relate.

Read these facts. You will find them informative—and interesting.

"If Oil Could Speak" it would tell the American public:

Is It Easy to Find Oil?

New oil fields are getting harder to find every year. And the cost to develop new reserves is increasing rapidly. In fact, one famous geologist said: "Today, the best place to find oil is in your head," and there's at least 100 billion barrels of bonus oil in the U. S. to prove it. Using all the most modern research techniques and equipment available, oil men "found" this oil by thinking out more efficient means of water-chasing reluctant oil out of old or sluggish fields. Generally, it takes from 10 to 15 barrels of water to flush out one barrel of oil. Finding new methods for recovering additional oil from underground costs the industry millions of dollars every year—but it is one way in which the nation's needs can be met.

Is It Expensive to Drill for Oil?

To give an example, the following product accounts for a small fraction of the total drilling costs. It's name is mud. But far from being common dirt, this fluid so vital for oil well drilling is a scientific blend of special materials which can cost as much as a dollar a pound. Tailor-made chemicals, caustic soda, corn starch, redwood fiber, shredded cellophane, walnut shells, chicken feathers, and any number of other strange materials are added to "mud" to solve drilling problems, such as caving, or controlling gas pressures. Oil wells consume $100 million worth of mud every year—840 gallons every drilling minute!

How Does the Oil Industry Finance Its Operations?

A growing America needs oil—39 billion barrels of it in a ten year period between 1956 and 1965. This is the equivalent of 80 percent of all the crude oil produced in the 98-year history of the domestic oil industry. Finding the oil and bringing it to market will cost a staggering $73.5 billion. Main problem facing the industry is where to find the money. About $44.5 billion may be available from provisions covering the cost of replacing facilities that are wearing out, such as percentage depletion and charges for depreciation. Another $18.5 billion must come from the earnings of oil companies. The remaining $10.5 billion will have to be borrowed from the savings of small investors all over the country. Far from being "money in the bank," these funds will depend on whether the oil man can make a fair enough profit to provide the incentive for others to invest in his business.

Automatic Control Advancements

Computer Gives Dispatcher More Accurate Forecasts

MAKING LONG-RANGE weather forecast through the ability of an "electronic brain" to analyze large volumes of data in a hurry is helping the gas transmission industry solve one of its biggest operational problems. Using data processed by these speedy computers, the dispatchers can plan withdrawals from underground storage months in advance without jeopardizing service in the event of a peak-day late in the season.

Private "Weathermen" Provide Data. Several private organizations as well as branches of the federal government are at work on this problem of long-range weather forecasting. One private organization has access to weather data and maps from the year 1899 and uses a system that relies on proven, weather behavior of the past to predict weather.

A complete set of more than 21,000 daily world weather maps is maintained. Each map has been analyzed in detail and classified for weather pattern: barometric pressures, wind directions and speed, temperatures, moisture and other data.

A battery of 16 teletype machines prints weather reports from all parts of the world 24 hours a day. The reports are summarized and posted hourly; at the end of each day a summary weather map is prepared from the collected information. Punch cards, prepared from each day's data, feed information to an electronic computer. In a matter of 20 minutes a predicted weather pattern, which would require one man two months to compile and evaluate, is available.

Prediction for Winter of '57-'58. What can we expect this winter? Without going into details, temperatures should be colder than last winter, but still a little warmer than the 30-year normal. Last winter was warmer by 354 degree-days than the 30-year normal for the six-month period. The forecast calls for the early winter to be warmer than the corresponding period last year, while January and February will be colder.

Delivery Plans Affected. The value of long-range forecasts is obvious. When the occurrence and severity of cold snaps are known in advance, the necessary amount of stored gas could be reserved for those days, and the remainder utilized by industrial customers.

In the summer of 1956, Cities Service Gas Company employed a private "weatherman" to forecast the daily weather pattern, covering both temperature and moisture, for the months of October, 1956, through March, 1957. Naturally, the first concern was the probable percentage of accuracy which might be expected from a forecast six months in the future. The laws of chance would promise an over-all accuracy of 50 percent; 65 to 75 percent accuracy was estimated before the six-month test period began.

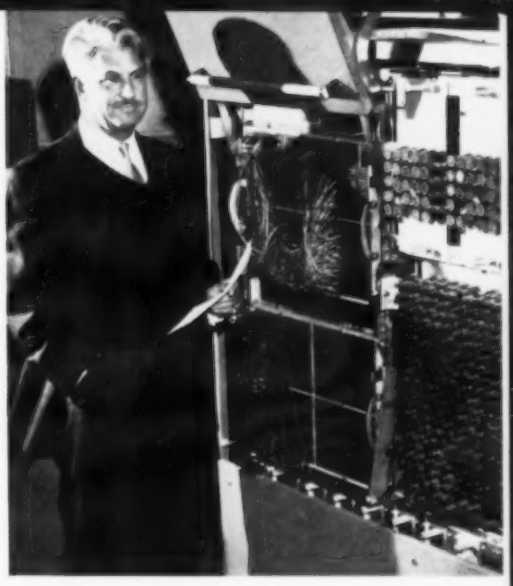
Relying on an expected accuracy of 75 percent, the Cities Service Gas operating division utilized gas storage withdrawals more freely during early and mid-winter cold periods, confident that remaining volumes of stored gas were ample to meet market requirements of late winter and early spring.

Cities Service Gas Company Degree Day Accumulation By Accounting Months

	U.S.W.B. Normal	1955-56 Actual	Forecast 1956-57	1956-57 Actual
KANSAS CITY, MISSOURI				
October, 1956	157	118	45	27
November, 1956	518	535	500	438
December, 1956	873	1,093	960	866
January, 1957	1,073	1,014	960	1,028
February, 1957	1,090	1,064	880*	989*
March, 1957	678	651	500	597
Total	4,299	4,475	3,845†	3,945†
WICHITA, KANSAS				
October, 1956	131	112	55	33
November, 1956	500	557	450	482
December, 1956	826	1,031	930	864
January, 1957	1,022	975	920	980
February, 1957	912	1,048	760*	956*
March, 1957	622	648	470	629
Total	4,013	4,371	3,585†	3,944†

NOTE:
* Through February, Forecaster's difference was 3DD= 0.09 percent.
† Through March, Forecaster's difference was 100DD= 2.53 percent.

NOTE:
* Through February, Forecaster's difference was 200DD= 6.03 percent.
† Through March, Forecaster's difference was 9.1 percent.



Dr. Irving P. Krick with an electronic computer that can perform the equivalent of 1000 man-hours of problem solving in 38 minutes.

The results of the 1956-57 weather service were gratifying to the company. A total of 3845 degree-days was predicted at Kansas City for the six months. Records show the actual number of degree-days recorded for that period was 3945, a difference of only 2.53 percent. Through February, the most critical operating period, the predicted total was 3345 degree-days; the actual was 3348 degree-days, or a difference of only 0.09 percent.

Timing Temperature Extremes Difficult. The forecasting system is not without its faults. One major weakness is in the timing of temperature extremes. During January and February when cold periods occur frequently, they reached the company's system from one to four days either early or late, and soon it became difficult to identify the specific period of the forecast, whether it was the cold wave that was due last weekend or the one forecast for the first of next week. Apparently all of them arrived, but not necessarily on the predicted schedule.

Last spring Cities Service negotiated a new weather service contract to cover the 1957-58 winter season. The new contract covers the same information supplied last winter, plus a long-range forecast dated April 29, 1957, covering this winter's weather.

—The End

ACKNOWLEDGEMENT
From an article in Cities Service Gas Company's "Dispatcher", Oklahoma City.

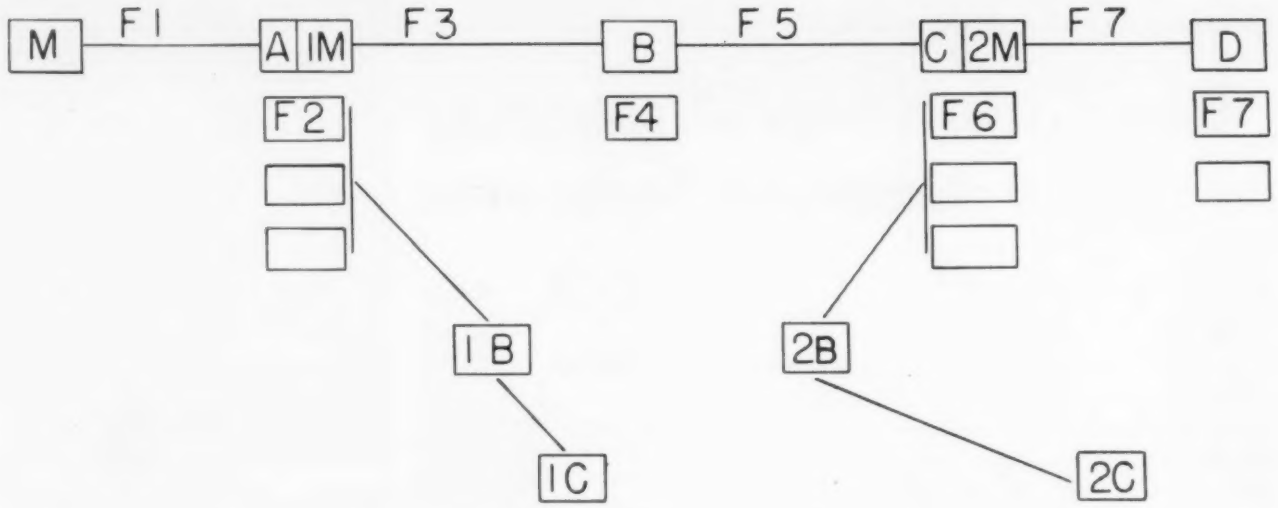


FIGURE 1—Block diagram of an automated pipe line system showing main line control points with take-off at stations A and B. Each take-off point acts as an individual system with the same control functions as the main line. Master control point on main line is at M with other control points for take-offs at A and C.

Automatic Control Advancements

Automation in Future Pipe Lines

Will systems of the future be controlled by "electronic brains"? Adaption of equipment available today could provide much of the controls needed.

By E. B. Turner
Systems Application Engineering Section, General Electric Company, Schenectady, N. Y.

REMOTE CONTROL of pipe line stations is a reality. The present trend is to more automation in all fields of pipelining—crude, products and gas. Individual circumstances determine the degree of automatic control, however, more and more unattended stations are planned for the future. Reliable remote control of pipe line stations has been due to reliable components and simplicity of system design.

What Does Future Hold? What is the future of automation in pipe lining? One answer could well be the use of completely automatic pipe line systems utilizing computers for control. Such a system is shown in Figure 1. To control such a system as a whole, each part which is not operated as part of a tight line must be considered as a separate and individual unit. In this case, there is a main system and two secondary systems. In the main system, shown in Figure 2, there are a master control point and four remote stations. Since there may or may not be deliveries at the stations along the system, there are many possible operating conditions. The object would be to place the system under automatic control using a special purpose computer.

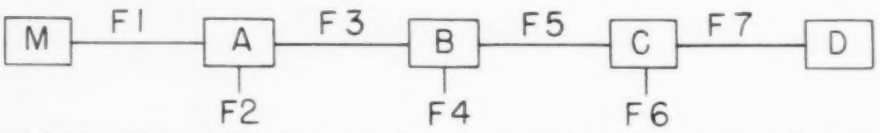


FIGURE 2—Block diagram of main line system considered as separate unit. Same conditions would exist for each branch system.

Operation of Computer. Factoring in limiting conditions that exist or develop would allow operation of the line at maximum throughput at all times. The computer would require the following intelligence:

Storage

- Line characteristics
- Available horsepower
- Useful horsepower

Input

- Dispatching Schedule
- Flow
- Pressure
- Gravity
- Set point
- Tank conditions
- Location of interfaces between batches

From this information, the computer would:

- Start-stop units
- Change set points
- Control tanks

If some abnormal condition existed, the computer would control for maximum throughput allowable with available equipment. The computer would consequently direct the pipe line operation, changing conditions as required to meet the dispatching schedule.

Components Available Today. Admittedly this concept is in the future, however techniques which comprise the over-all approach are in use today. Although the equipment to accomplish automatic pipe line operation is not shown in any catalog, the individual components are available. These will improve with time as will the economic aspects and the practicality of applying this equipment.

Beginning of Automation. Probably the first steps in pipe line automation, although the word was not used at that time, were such things as motor-operated valves, remote tank gages, electrical-protective relaying, and temperature-protective elements. Along with these came such things as measurement of flow, automatic detection of interface between tenders, and automatic pressure-regulating systems.

First Major Step. A sequence control panel which allowed the operator to perform the starting or stopping of a pump unit by pushing a button and having the necessary operations take place in a predetermined manner was the first major step toward complete automation. The initial use of sequence control still utilized visual check of valve operation, breaker closure, motor acceleration, bearing temperature, etc. Then by evolution, sequence control determined whether it was safe to continue by considering pressure, temperature, position, voltage, current and other protective requirements. At this point, "semi-automatic station" operation has been reached; "semi-automatic" since there is no sequencing of the pumping units. Figure 3 illustrates a control desk for this type of station.

Unattended Automatic Operation. The philosophy of remote stations entered at about this point in the evolution of unattended automatic operation. Figure 4 illustrates the functional components of an unattended station. Certainly unattended operation could not take place without reliable protective systems. A diagram of the electrical protective system is shown in Figure 5.

Devices which have been in common usage are the pressure filled systems for detection of temperature, and bourdon tubes with limit actuated devices for pressure protection. Presently, resistance strain gages are being used to detect pressure extremely accurately and to provide a number of desired functions from a single detection point. In the temperature field the thermocouple or resistance element is being more commonly used, giving more accurate and reliable results than with other systems. All of these changes have come about to fill the need for more

FIGURE 3—Sequence control panel at Trans Mountain Oil Pipe Line station at Laurel, Washington. Starting or stopping any units will automatically perform all control operations necessary. Colored lights on console indicate operation of units.

accurate, more reliable and easier methods of accomplishing the required protection in a pipe line station.

Improved Instrumentation. Instrumentation under which it is possible to group the pressure-regulating, throttling valve control and general pressure and flow measurements have also undergone a number of changes. The use of resistance strain gages in pressure regulating systems has eliminated a fairly costly and not completely maintenance-free compressed air system. It has also eliminated the necessity for long runs of small-diameter, high-pressure tubing and made it possible to operate a meter panel without the possibility of oil or gas leakage. Flow measurements of increased accuracy over a wider range of flows are required. This quantity can be a very important one in overall operation of a pipe line system.

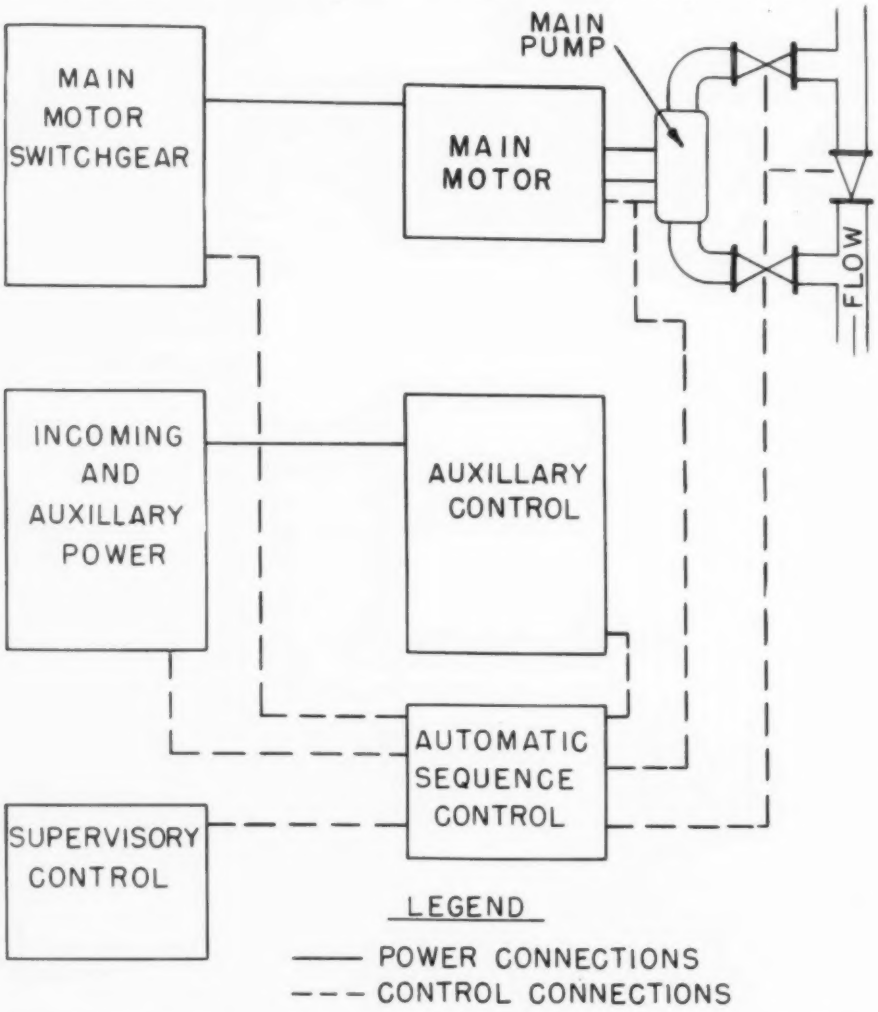


FIGURE 4—Block diagram of a remotely supervised pipe line pumping station.

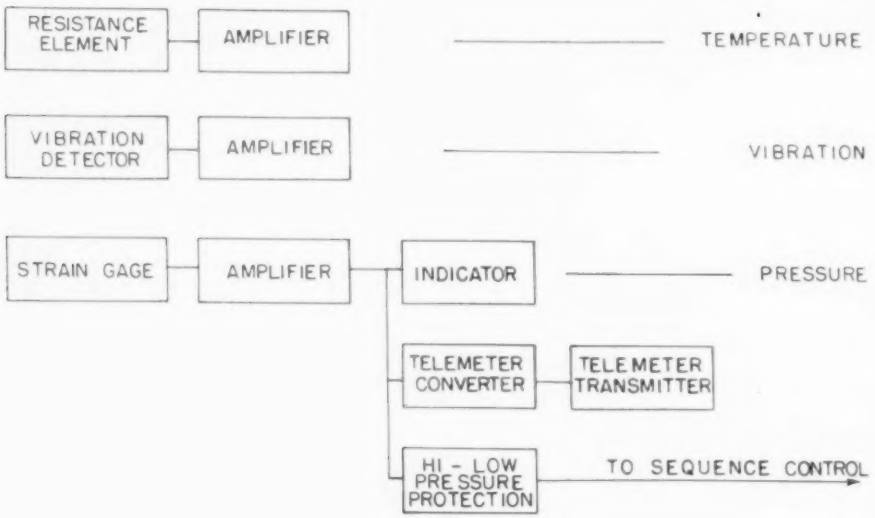


FIGURE 5—Block diagram of electrical protective system. Electronic amplifiers provide local instrumentation protection, and conversion to signals acceptable for telemetering.

Telemetering Makes Remote Operation Possible. Telemetering in a basic sense is the reproduction or simulation at a remote point of a measured quantity. The two basic types in use are frequency and time duration. The pressure, temperature or flow reading loses all of its unique or specific character since it is converted to a common frequency or time base. Rather than the primary variable, the remote reproduction measures only time or frequency. With this method accuracies within 1 percent of full scale have been obtained.

More complex systems will mean more remote points sending information to a central point. Consequently, there must be some way of making this information more intelligible, more acurate, and in a form that can be readily interpreted.

Data logging equipment seems to be the best answer to this problem. Conversion of measured quantities to a digital form will be required. Since the digital information can be transmitted with very small chance of error, the accuracy of the system is now only dependent upon the accuracy of the primary measuring components. Accuracies of ½ to 1 percent are obtainable. Not only is more accurate, more readable, more interpretable information provided, it also allows the system to be set up in such a manner that readings can be made simultaneously on a programmed basis.

Supervisory Control Proves Dependable. Supervisory control is another tool of the remote unattended station. It has been in use in areas which require a high degree of reliability for a number of years. In fact, supervisory control dates back into the early 1920s. Control of the New York subway power system was provided in this manner.. The early type control system was called the synchronous selector type and included

such features as exposed power and control fuses, open knife switches, large polarized relays and grouped relays. The heart of this system was the synchronous selecting switch. Since all the wiring and associated circuits passed through one device, it could get pretty congested.

An improved design used more inductive relays. Further improvements in the late 1940s provided easily removed permanently wired equipment. A smaller more highly reliable relay (Figure 6) with approximately ten times the life was incorporated. Since the wiring terminates in plugs, the relay rack is easily removable (Figure 7). The whole rack assembly can be taken out for easy maintenance or inspection.

Automation at Present. Where in the field of automation is the pipe line industry today? The number of unattended, remote controlled stations is increasing rapidly. Sequence control is in common use in manned stations. In at least one instance an entire pipe line system is being controlled from a central location. One thing is certain, regardless of the answer, there is always an opportunity to take a step in the direction of automation. Total pipe line automation is a challenge which in all probability will become a reality before too long. —**The End**

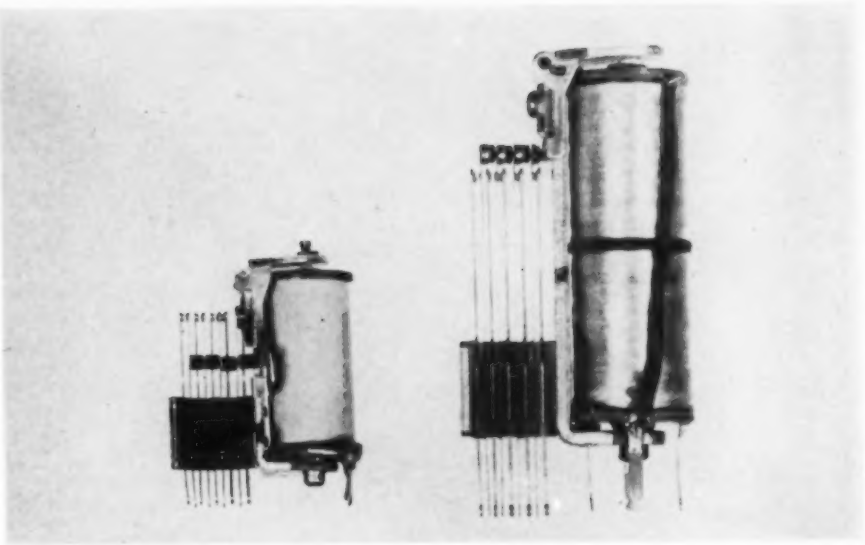


FIGURE 6—New supervisory control relay. Although compact, relay has approximately ten times the life of older designs.

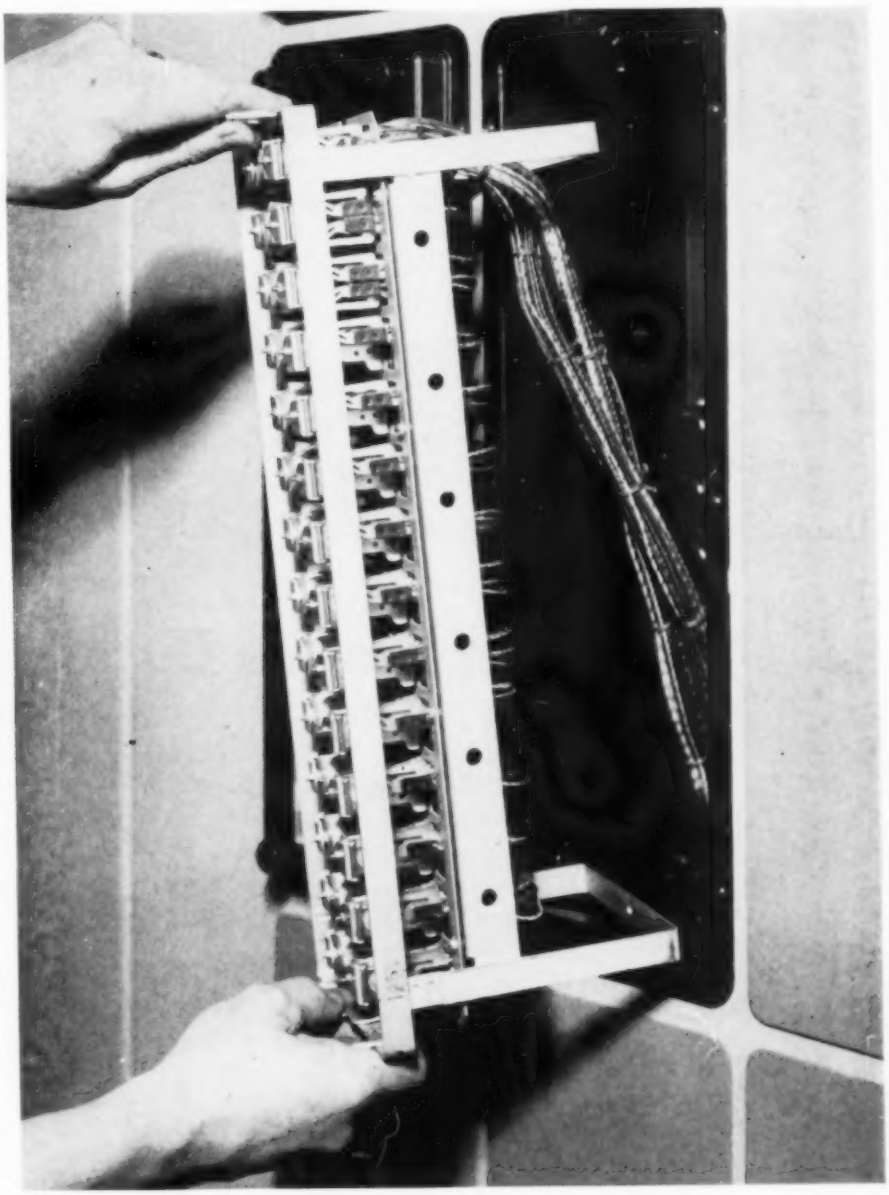
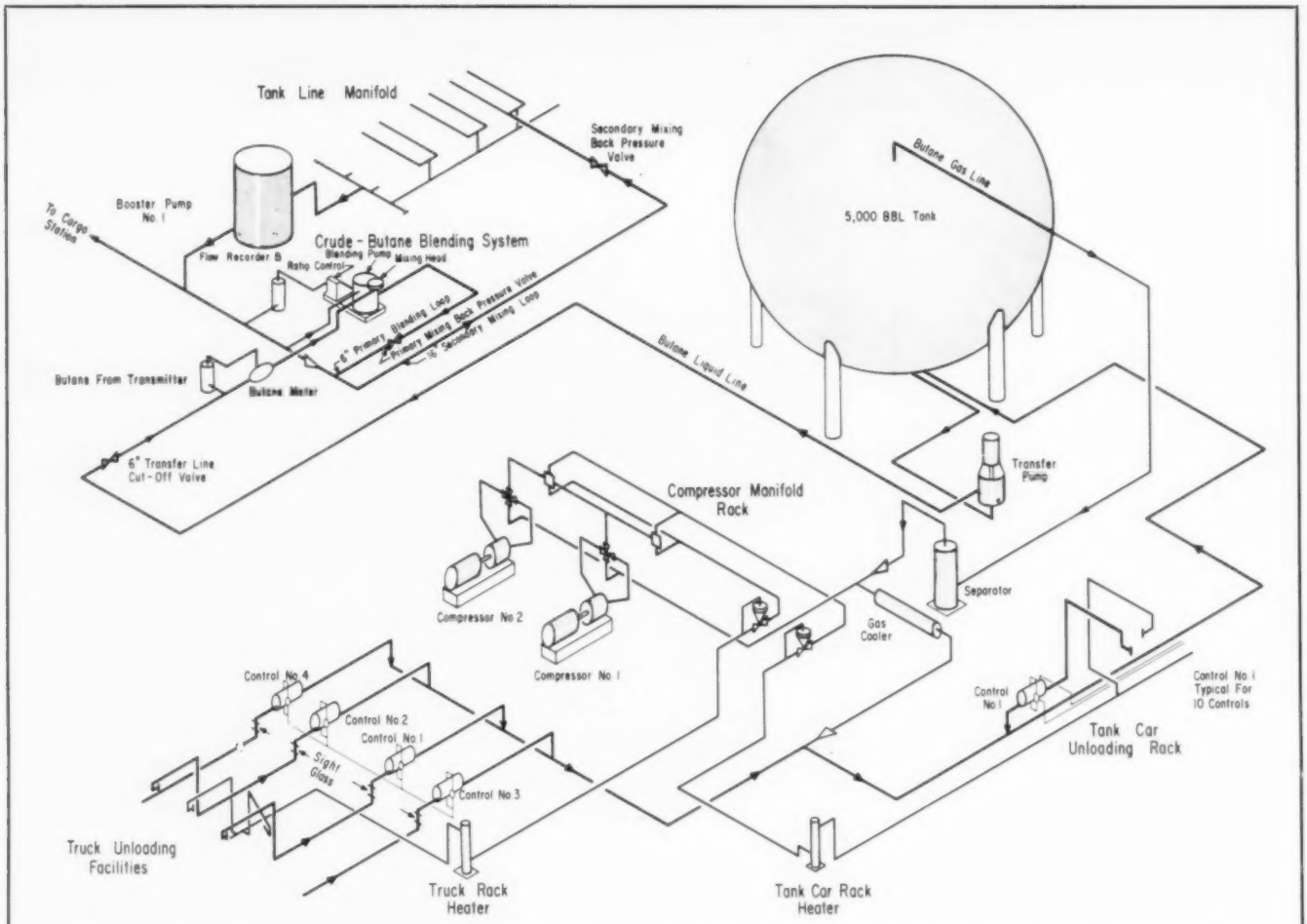


FIGURE 7—Wiring of relay rack terminates in plugs making the rack easily removed for inspection or maintenance.

About the Author

E. B. Turner, application engineer in General Electric Company's Petroleum Industry Engineering section, has several years experience in the development of control equipment for pipe line pumping and compressor stations. After serving in the Navy during World War II, Turner returned to Texas A. & M. College and completed studies in electrical engineering in 1949. He taught in the Electrical Engineering department of the college, then went into construction work with Ebasco Services, Inc., before joining General Electric in 1951.



Operating sketch of Sun Oil's automatic butane unloading and blending terminal at Nederland, Texas. Products are received by tank car or truck and transferred to storage, then blended into outgoing crude stream by remote control from the pump station.

Automatic Control Advancements

How Sun Blends Butane Automatically

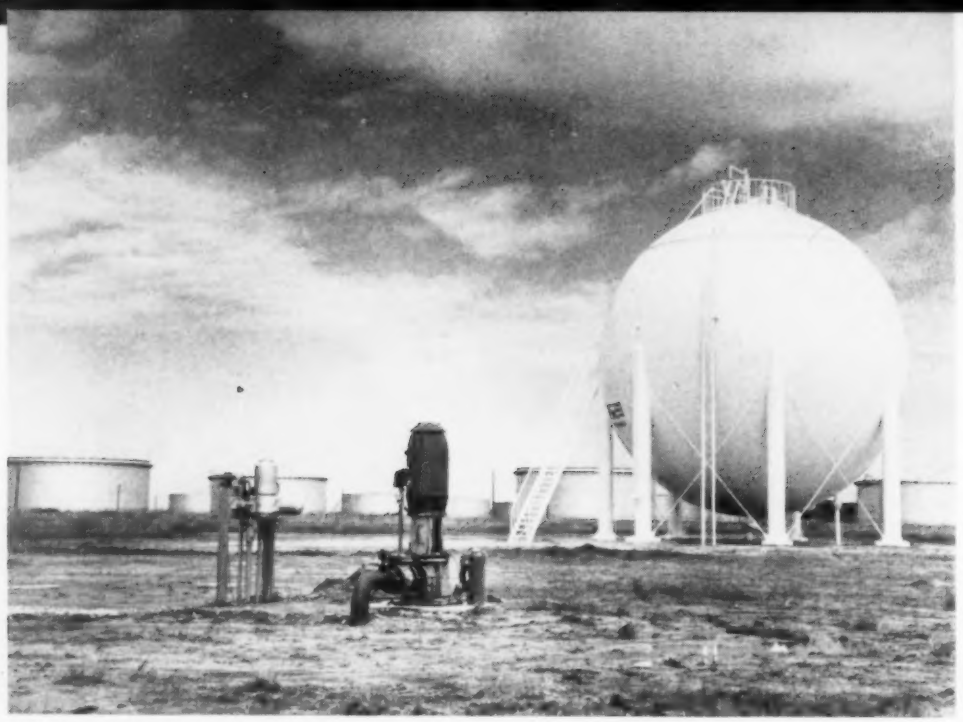
New system takes deliveries from tank cars or trucks, blends them into outgoing crude stream automatically. Blends with vapor pressures no greater than atmospheric are achieved in two mixing loops.

SUN OIL COMPANY recently put into operation an automatic butane unloading and blending terminal at the company's Nederland, Texas, station. Operating experience has shown that the blending of butane into crude oil shipments is both economical and feasible. Butane is automatically received at a ten position railroad tank car rack or four truck unloading positions, transferred to a 5000-barrel storage sphere and blended into an outgoing crude stream by remote control.

To unload butane, vapor is taken from the top of the sphere, compressed, heated, and forced into the top of the tank cars or trucks, driving the liquid out of the vessel through a pipe line to the bottom of the sphere. A monitor senses when liquid product is removed from any tank car or truck and transmits a signal that will close the valve to that vehicle. When all tank vessels on the unloading rack are empty, automatic controls shift the valving so that compressors will take suction on the tanks and recover compressed gases. Vapors pass through a cooler and are re-

Truck unloads at one of four positions at the automatic truck rack. Compressed gas forces butane out to storage at a preset rate.

Compressors at left boost pressure on butane vapor drawn from the top of the sphere to unload trucks and tank cars. Rack selector valves, selector switches, starter panel, and flow controls are on compressor manifold rack at right.



5000 barrel sphere holds butane to be blended into outgoing crude. Centrifugal booster pumps up to 590 barrels per hour through 6-inc line to blending head nearly a mile away. Pump and blending operations are controlled from pump station near tanker dock.

turned to the sphere through the liquid line. Bubbling of vapors through butane in the sphere removes heat of vaporization and liquifies the gases.

Liquid butane from storage is pumped approximately one-mile through a six-inch pipe line and blended automatically into crude oil prior to loading aboard tankers. Rate of crude flow is measured and butane flow is regulated automatically to give a blend with a vapor pressure no more than atmospheric pressure.

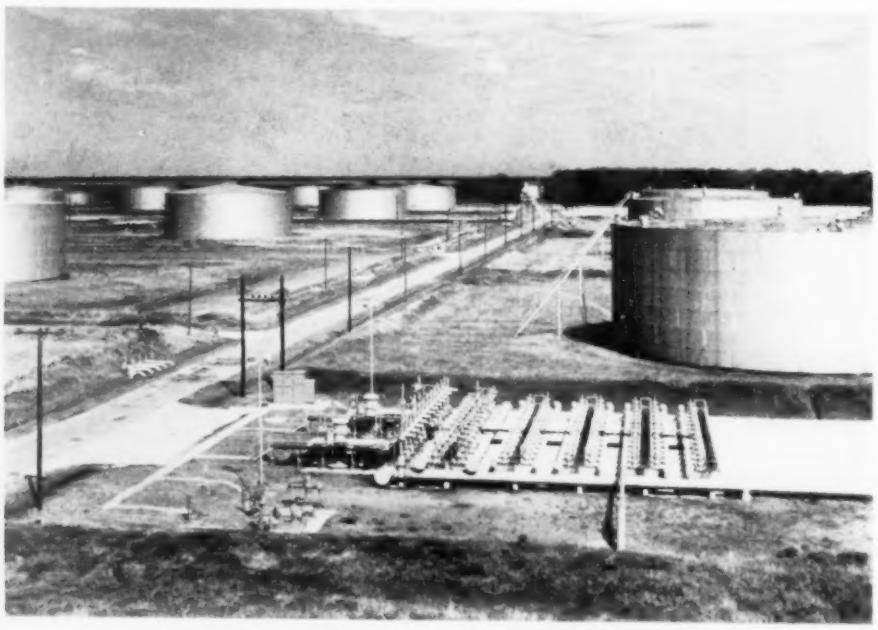
Details of System. Upon arrival of tank cars or trucks at the butane terminal, the operator makes necessary pipe connections, and then opens vehicle and rack valves before starting the automatic unloading cycle. Prior to compressor start-up, the operator turns the proper cut-off valve switch to the "on" position. Valves and their control switches are mounted on the compressor manifold rack.

To start the operating cycle on the control equipment, the unloading rack reset switch is energized first; selecting the proper reset, tank car or tank truck, sends power to the required relays. Each switch affects only the unloading rack and has no effect on either compressor. Indicator lights show when the liquid butane transfer cycle is ready to begin.

The next step is to put the compressors on the line; compressors operate independently and may be put on either rack. However, two selections must be made for each, electrical setting and mechanical valve positioning. Piping arrangement for each compressor is set by a 2-inch, three-way plug valve mounted on the compressor manifold just in front of the compressor. Electrical setting, made by the rack selector switch, provides electrical power to the tank or truck rack controls as desired.

When compressor settings are made, compressors may be started by one of the starters mounted on the manifold rack. Each starter has four switches in its control panel, a selector switch, on-off switch, compressor start-stop switch, and overload reset.

After compressors have been started, the manual-latch low pressure cut-off valves may be lifted and latched open; the proper cut-off switch is put in the off position completing the operators start-up of the unloading cycle.



Automatic butane blending system is located beside Sun's Nederland station manifold. A primary, 6-inch blending loop; and secondary, 16-inch low pressure loop insures that butane will not flash out of blend during transfer to storage or shipment aboard tankers.

Automatic Operation Sequence. When the operator starts the compressor, the discharge pressure sets the four-way selector valve in the "handle down" position for the liquid cycle. Compressor suction is taken on the sphere through the separator, and discharged through the gas heater to the unloading rack. Hot gas then pushes the liquid out of the tanks into the liquid detector, through the control device to the inlet at the bottom of the sphere.

Liquid Rate Control. Liquid detection and control is maintained by means of a deaerator, a float activated three-way valve, a liquid cut-off valve with switch, and flow rate controller. As the liquid butane starts to enter the deaerator, flow rate is controlled by gas exit from the ½-inch regulating valve. When the de-

aerator has reached full capacity, the gas bleed off is stopped and the float activated three-way valve is opened. This allows the liquid cut-off valve to open, unloading liquid from the vehicle. Rate of flow is maintained by the flow-rate controller.

Gas Switches Cycle. As the liquid cut-off valve opens, it energizes a switch, sending a signal to the controller showing that the position is unloading liquid. When all of the liquid is out of the tank, gas enters the deaerator, lowering the liquid level. This causes the float activated three-way valve to close loading the top of the liquid cut-off valve and closing it. The liquid cut-off valve in turn changes the position of the valve switch and sends a signal to the controller.

When all vehicles being unloaded are empty, the controller reverses the pumping cycle. An additional control device at each unloading position, indicates whether or not there is a vehicle at that position. When it shows that there is a vehicle in position, the controller will wait for that vehicle's "empty" signal from the liquid detector.

Two Safety Features. Sequence of the liquid controller possesses two operating safeguards.

1. The controller will not reverse the cycle until all vehicles being unloaded are empty, or the unloading cycle is stopped for a period of time.

2. The controller will not reverse the cycle if there is a vehicle connected to the unloading rack that has its valves closed.

This puts some limitations on operations, for example if there are two vehicles being unloaded and a third is connected to the rack, the first two will have to wait for the third to finish before disconnecting. Similarly, if there are several vehicles being unloaded and another is connected but does not open its valves, the cycle will not reverse and unloading cannot be completed until all valves are opened.

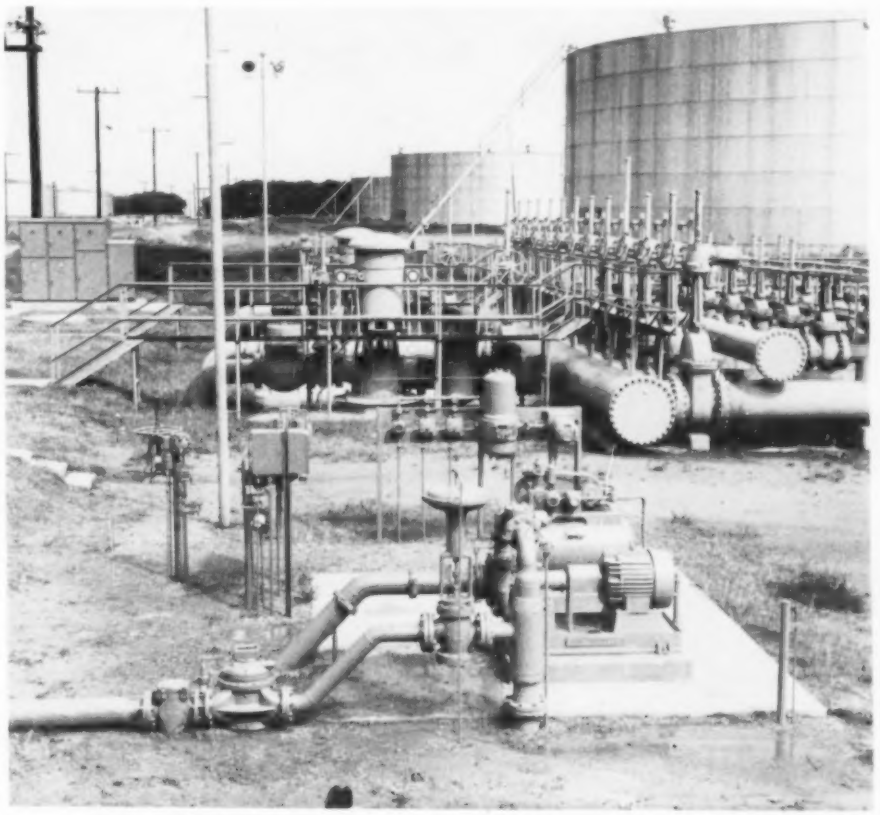
If the unloading cycle is stopped prematurely, controller action will depend upon the time of shutdown and ambient temperature effect. Should shutdown occur during the liquid phase, the cycle may be reversed and go into the gas phase. However, if the cycle was in the gas phase it will stay in the gas phase or cut off completely if the low pressure cut-off valves close. If an operator needs to interrupt the unloading sequence for some reason, he checks the indicator lights to determine the stage of unloading and starts up again at that same stage. Should the controller reverse the unloading cycle, the change is shown on the indicator light. Position of the automatic four-way valve is then changed to put the compressor on the gas line leading to the unloading rack and compressor discharge goes to the gas cooler. At the same time the controller cuts off the gas heater. Gas bled to the tank; when pressure reaches some preset value the tank is automatically connected to the suction side of the compressors. Gas is then taken from the tank into the gas cycle.

Shifting From One Rack to Another. When it is necessary to shift from truck to tank car rack, or the reverse, the operator does not need to shut down the rack in use. All steps in the shutdown sequence are automatically taken care of in a normal start-up of the other rack. In shifting back to the original rack, indicator lights are first checked. If they are the same as when the sequence was interrupted, and the low pressure cut-out is latched the only action necessary is that of resetting the rack selector switch, the rack selector valve, and start-up of the compressor.

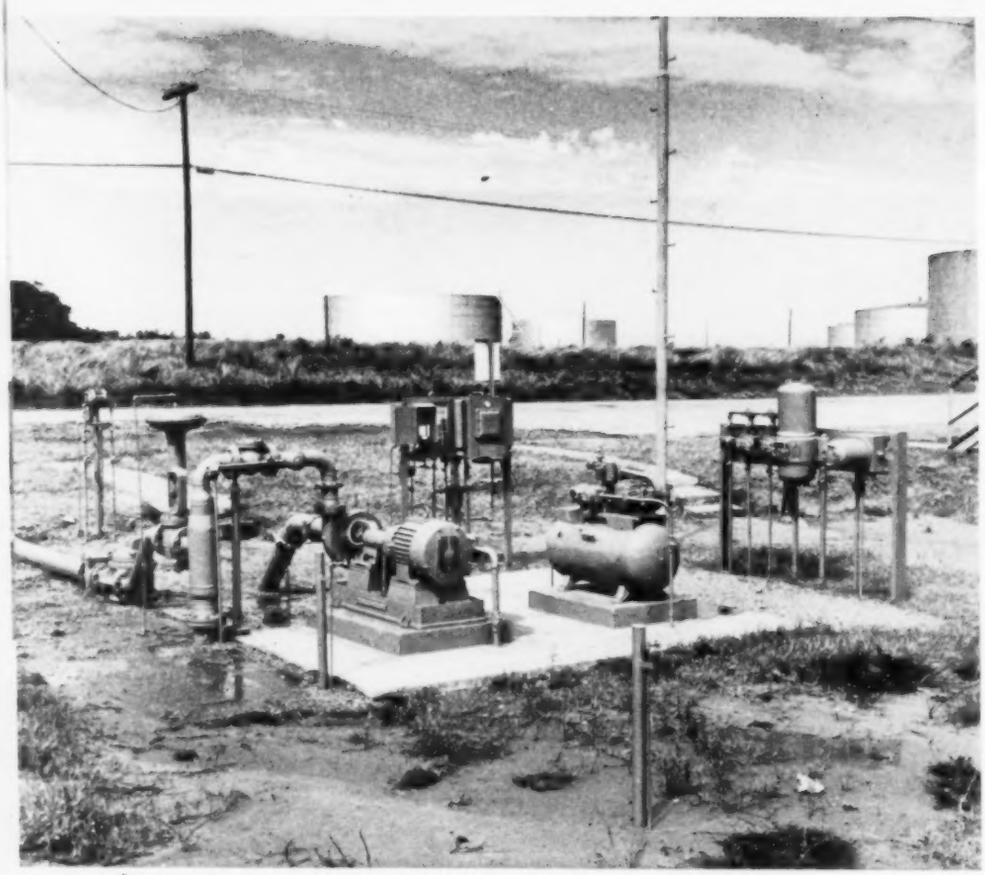
Should there be a change in the indicator lights, a normal start-up sequence is initiated. The one exception would be if indicator lights showed the rack unloading originally was in the gas stage of the cycle, then cut-off and later indicated that unloading had been completed, trucks or tank returns to the sphere via the liquid line.

Once unloading shifts to the gas cycle it continues until gas pressure has been reduced to a preset value. Then the low pressure cut-off valve closes, compressors are shutdown, and the "off" indicator lights. Unloading is completed and the trucks or tank cars may be disconnected.

Low-Pressure Tank "Salvages" Butane. A low-pressure holding tank behind the compressor manifold rack serves as a receiver for butane used in the diaphragm-operated devices. As each valve operates, service gas is



Butane from storage is metered and injected into the blending head in the center foreground. Approximately 2000 barrels per hour of the crude stream is bled off, boosted to 60 psi pressure by the pump just upstream from the blending head. Rate of butane injection is varied to yield a preset percentage mix with the uncontrolled crude flow.



Sampling risers are located at many points on Sun's primary and secondary blending loops. Vapor pressure of the blend is checked frequently to make sure that blending is complete within preset limits. Normally, blend is achieved some 10 to 15 diameters below injection point.

cars could be disconnected. Unloading would have been completed.

Compressor Safety Shutdowns. During the unloading cycle, compressors may stop for any of four causes. High water temperature, high gas temperature, or high gas pressure will stop the compressors temporarily; they will come back on automatically when the condition corrects itself. In case of motor overload, the compressor may be put back on the line by waiting two minutes and then pushing the stop switch, the reset switch, and the compressor starter.

Butane Blended Automatically Into Crude Stream. To make a blend, butane from the 5000-barrel sphere is pumped through a six-inch line by a vertical type centrifugal booster pump approximately one mile to the blending station. In normal operation some 590 barrels of butane are blended into 7000 barrels of crude per hour. Control is carefully maintained to yield a mix with the vapor pressure less than atmospheric pressure.

The butane booster pump is rated at 300 pounds per square inch at 590 barrels per hour. Pressure is maintained on the liquid butane at all times because if pipe line pressure drops below the vapor pressure of the butane or blend in the line it will flash to a gas and flow on down the line in two-phase flow.

Two Blending Steps Used. To make use of a crude booster pump that did not have a high enough pressure rating for the butane-crude blend at the volumes handled, primary and secondary blending loops were devised. Discharge of the crude pump, about 7000 to 10,000 barrels per hour at a pressure of approximately 40 psi goes through the 30-inch discharge line which is swedged down to a 16-inch just ahead of the blending position. About 2000 barrels per hour are bled off and boosted to about 60 psi; back pressure is maintained by a 6-inch back-pressure valve in the primary blend loop. Butane is injected into the crude just downstream from this small booster pump. Experience with the blending operations has shown that a uniform crude-butane blend is achieved some 10 to 15 diameters down the line.

Volume of butane introduced into the blending head is carefully controlled to produce a blend of a predetermined percentage. Butane and crude flow are measured by orifice meters; the controller operates a diaphragm valve in the butane line just above the blending head. Crude flow is the uncontrolled flow.

The primary mix, a 28-pound vapor pressure crude-butane blend then enters the 16-inch line or secondary blending loop. The blend, approximately 2000 barrels of crude and 590 barrels of butane per hour, is then blended with the remainder of the 7000-barrel stream in the 16-inch loop. A 10-inch back-pressure valve maintains approximately 30 psi back pressure on the secondary loop. However, when the blend passes this valve and leaves the blending loops it has a vapor pressure less than atmospheric pressure.

Blending Done Remotely. All of the blending operations are controlled from the cargo station located about a mile away from the blending plant. To start the blending system, the crude pump is started first. Next the air compressor starts, providing control air. As soon as crude is flowing, air pressure is up, and the primary blending booster is running, then the butane pump starts and blending operations begin. Several safety features are provided to prevent putting raw butane entering the crude storage tanks. Flow switches are fail safe; diaphragm valves also close in case of the loss of air.

Samples Check Blend. Blending operations for the first several months of operation have met all requirements. Blends are checked constantly to make sure that a proper vapor pressure blend is achieved. Sampling taps are located at many points along the primary and secondary blending loops. Uniform blends are usually obtained in 10 pipe diameters or less below the injection point.

Since any raw butane that gets into the line at a pressure below its vapor pressure will become a gas and remain as a gas on down the line to the loading dock, every control precaution is made to control blending operations positively and precisely. So far no such operating problem has arisen with this system design. —**The End**

FIGURE 1—Typical LACT meter installation, Webster field, Texas. In addition to prover tank, provision is made for using a master meter to prove the meter. Sampler and sample container are also shown. Temperature-compensated meter automatically prints run ticket.

Automatic Control Advancements

What's in the Future for LACT?

Lease automatic custody transfer is now advancing from experimental phase to routine operation. More and more installations are being given permanent authorization.

By John C. Watts, Engineering Editor
PIPE LINE INDUSTRY

THE PROGRESS of lease automatic custody transfer has been slow but steady during the last few years. Although improvements can be made, most technical problems have been overcome. In most cases, the principle of LACT is acceptable to all parties concerned: producer, pipe line, royalty owner, and state regulatory body. However, all but a few of the LACT installations now in operation were approved by the regulatory bodies on a temporary basis only.

With continued expansion of LACT installations, manufacturers will be able to design equipment for the specific use. Since most of the units have been experimental, designers have been limited to equipment that was designed for other uses. Many times this meant compromising on certain features which made the installation more complicated or expensive. Development of automatic

FIGURE 2—Portable meter installation used by Cities Service Pipe Line in the Texas Panhandle. All the LACT equipment is skid-mounted, making the unit completely portable. This makes it possible to check the equipment in the shop before being installed in the field.

equipment especially designed for LACT units will provide less expensive and more dependable operation, requiring less maintenance and fewer safety devices.

LACT Use Depends on Economics. Economic considerations are the biggest limitation to automatic installations today. With the present price structure estimates are that to be economically feasible, a lease will have to handle at least 300 barrels a day. Only about 5 percent of the leases handle this much oil, however 47 percent of the oil is produced from these leases. One answer to this problem is the unitization and consolidation of smaller leases. In most cases, the initiative has been taken by the producers. This is because the operators stand to save the most money, and also automatic lease operation is a prerequisite of automatic custody transfer.

New or Isolated Leases Pay-Out First. The largest use of automatic equipment will be for new leases, or where old equipment must be replaced. Even though substantial savings are realized through automatic controls, if a manual battery is already in use, the cost of the change-over cannot be justified in most cases. In new producing areas such as the Four Corners Area, maximum advantages of automatic leases can be realized. A further incentive for automation in this area is the isolated location of most of the leases.

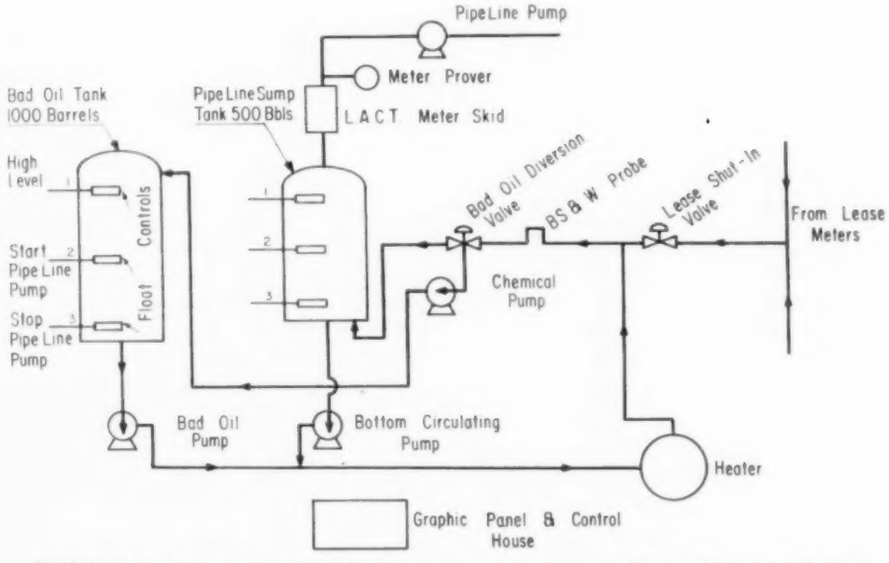


FIGURE 3—Schematic of typical meter automatic custody transfer installation.

Standardization Will Cut Cost. One reason for the high cost of automatic installations is that the equipment is still in the development stage. A LACT installation is usually obsolete before it is put in operation with new equipment being brought out every day. After some degree of standardization is established, the manufacturers will be able to cut their cost through mass production.

Use of LACT Expanding. Despite the limiting factors, the use of LACT has been growing rapidly over the last few years. The first actual automatic custody transfer of oil in this country was made by Gulf Oil Corporation, to the Kaw Pipe Line Company on December 22, 1955.

As an example of the growth since then, Pan American Petroleum Corp. states that at the end of 1956 they were selling automatically only 120 barrels of oil a day. By the end of 1957, they expect to be selling 15,000 barrels a day to pipe lines automatically. Although Pan-Am is one of the pioneers in the field, many other companies are as active in the development of LACT.

Investment Savings to Producer. Among the advantages offered by LACT to the producers are reduction in investment, prevention of evaporation and bottom losses, and better utilization of personnel. In a normal battery, enough storage will be provided for at least two or three days production. Where automatic custody transfer is practiced, only enough storage to allow for weathering of the oil and provide for emergency storage will be necessary. This could result in a saving of as much as $20,000.

Indications are that evaporation in storage causes a drop in gravity of from 0.2° to 0.5° API. In some cases, this loss in gravity could cause a drop in the price of the oil, however in all cases it represents a volume loss.

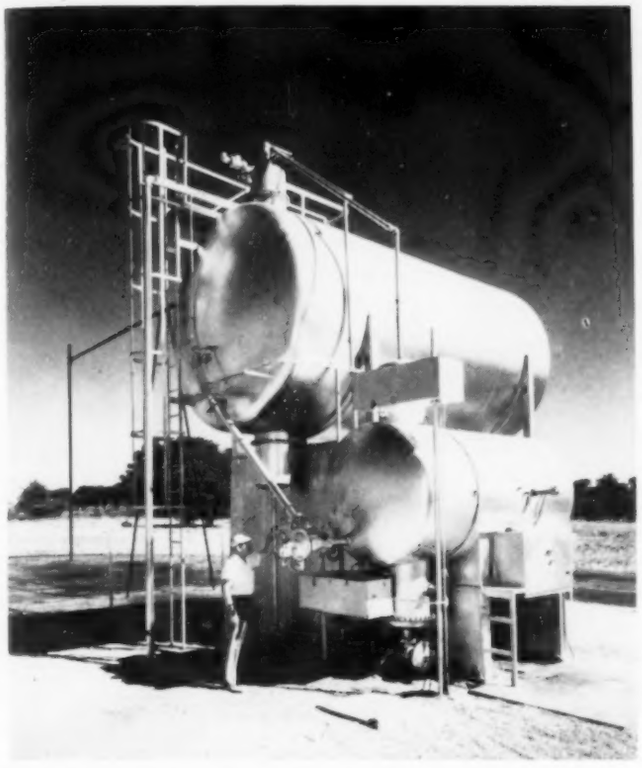


FIGURE 4—Example of LACT installation used by Pan American Petroleum Corporation. Small tank is the metering vessel with larger elevated tank serving as surge and storage tank. Tanks are glass-lined to prevent encrustation. A pressure of 12 psig is maintained in the tanks to prevent loss of light ends due to evaporation.

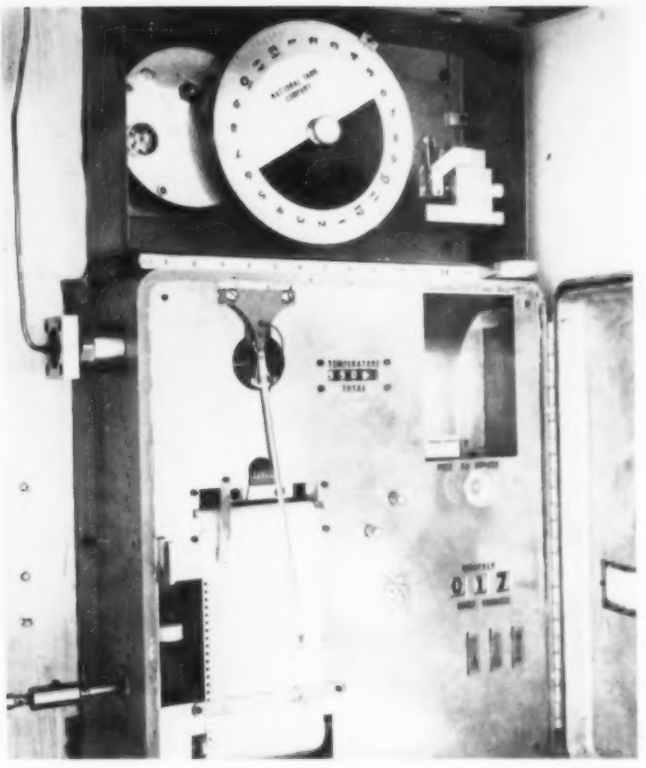


FIGURE 5—Control panel for Pan American's LACT unit. Included is a 31-day clock which is preset to begin runs. Temperature measurement is by digital counter and temperature strip chart. Run tickets are inserted in opening at upper right. The monthly dump counter can be preset to shut unit down after the allowable is run.

Three-tenths of 1° API gravity represents a change in volume of approximately 0.5 percent or about 5 barrels in 1000 barrels. If one-half of the daily production of the U. S. were sold on an automatic basis, and the gravity savings were 0.2°, volume savings would be nearly 10,000 barrels per day. In addition to the savings in evaporation losses, automatic operation will reduce tank bottom losses. In an automatic battery, the oil is not in storage as long, reducing the amount of settling. Also, bottoms are recirculated and redissolved in the oil or disposed of through the treating equipment.

Since less of the pumper's time will be required in switching tanks and being present to witness the pipe line gager, he can spend more time performing other duties around the lease. In some cases this may actually result in less manpower, in others it will enable better operation and maintenance of the lease.

Pipe Lines Benefit, Too. Although most of the investment savings accrue to the producer, the pipe line benefits through LACT, too. Among the advantages to the pipe line are: increased accuracy and better use of facilities and personnel.

Accuracy of the early installations was determined by checking the automatic metering against a standard manual gage. As one operator put it: "This is like checking a micrometer with a yardstick." Accuracy of manual gaging will be affected by encrustation on the inside shell of the tank, permissible tolerance in reading the gage line (¼ inch, which in a 500-barrel tank is equivalent to a 0.3 percent error), changes in the thickness of the BS&W level under the thief hatch between the opening and closing gages, errors in gravity and temperature measurement, and flexure of the shell and bottom of the tank due to changes in the head of oil.

More Accurate Measurement. Most of these errors are cumulative in effect. The total cumulative errors in hand gage measurements may amount to approximately 100 barrels in 10,000, or 1.0 percent minus or 15 barrels in 10,000 or 0.15 percent plus; the non-cumulative errors may be approximately 35 barrels in 10,000 or 0.35 percent, plus or minus. An error of 100 barrels, in 10,000 or 1.0 percent in the total allowable for Texas would approximate a difference in value of $100,000 per day.

In one installation where a positive displacement meter was checked against manual gaging, the agreement over a six months period was 0.185 percent, with the meter having indicated less oil delivered than the manual gage. Inspection of the tank revealed a build-up of wax on the tank shell in excess of ½-inch. This wax was removed and during the next six months the agreement was 0.009 percent. At the end of the second six-months period, the spread between the two readings had begun to increase again and inspection of the tank showed a build-up of paraffin again. In a LACT unit, whether a P.D. meter is used or the volume is metered through dump tanks, encrustation is not a problem. Most of the dump tanks are either plastic-coated or glass-lined; also the oil does not stand in the tank, so there is very little chance for the wax to build-up.

Most Efficient Scheduling. Scheduling of the oil through the pipe line

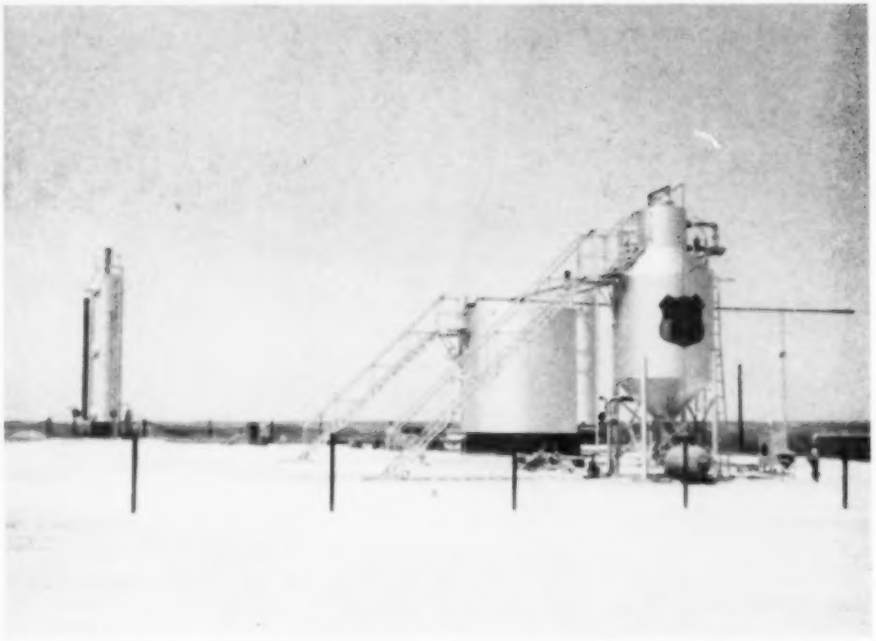


FIGURE 6—General view of the Phillips Petroleum Company LACT installation on the Ranch "C" lease in the Texas Panhandle. This was the first lease to be permanently authorized by the Texas Railroad Commission to sell oil automatically. Installed December 19, 1956, in excess of 40,000 barrels of oil have been sold through this unit.

gathering system is more efficient with LACT. With manual gaging, the tank runs have to be scheduled to start when the gager can make his rounds. Normally the gathering system will be in operation no more than 12-14 hours a day, the rest of the time, the system will be idle. With LACT, the batteries can be scheduled to come on as capacity is available in the pipe line, consequently the system can be used during the entire 24 hours. Smaller lines can be used since the gathering system will not handle a large volume of oil during part of the day and be idle the remainder of the time. Again this saving will be obtained mainly in new systems and where old facilities have to be replaced or enlarged.

As is the case for the pumper, the pipe line gager's time will be better utilized where oil is sold automatically. In many cases, a gager will have to visit a lease only once a month, to set the equipment for the monthly allowable and change the run ticket. Since all run tickets will be printed automatically, the gager's clerical work will be reduced, too.

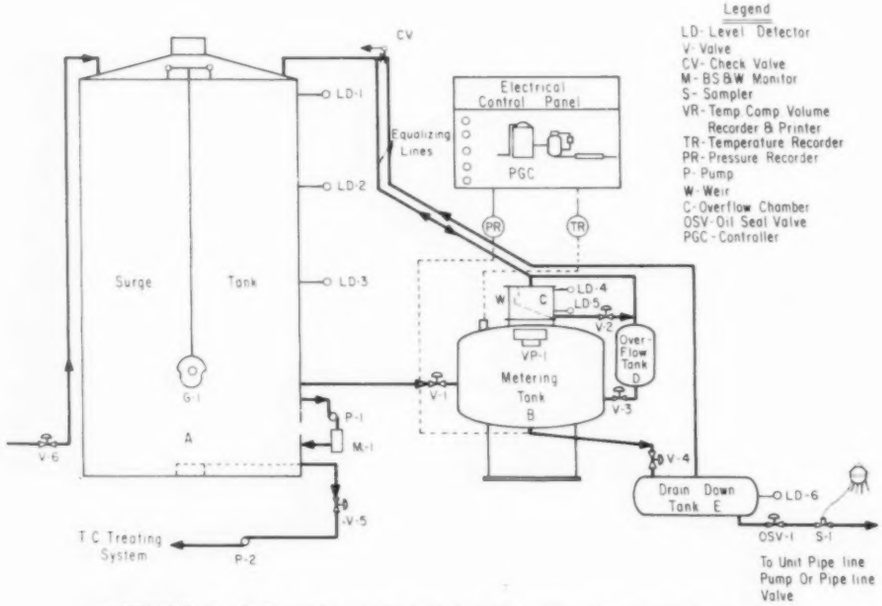


FIGURE 7—Schematic of typical LACT unit using metering tanks.

Volume Determination. LACT systems now in use or under study use the same basic methods for determining gravity and BS&W. The major difference between the various installations is the method used for volume determination. Two methods are in general use, positive displacement meters and dump-type metering tanks, with a third, gravimetric metering, being used in a limited number of cases.

Where the pipe line company makes the decision, P.D. meters are generally used. Pipeliners have had excellent results using P.D. meters for products service and in most cases are familiar with their performance and maintenance problems.

P.D. Meters Accurate. P.D. meters, if kept calibrated and in good repair, will give accuracies better than 0.1 percent, when used within 30 to 100 percent of capacity. Humble Pipe Line Company has bought more than 1 million barrels of oil at one meter installation with an accuracy of 1.5 barrels in 10,000 or 0.015 percent. Meters used for LACT have automatic temperature compensation giving readings in net barrels at 60° F.

To maintain the accuracy of measurement necessary, P.D. meters must be calibrated at least once a month. This is done either with a portable master meter, which has been previously calibrated at a central location, or by a prover tank. The use of the master meter will probably be limited to large fields where there are a number of LACT installations. Where a master meter is used, the crude must be of the same gravity.

When a prover tank is used, procedures outlined by the API Std. 1101 are followed. The most common type of prover tank is the seraphin-neck type. After installation on the lease, the prover tank is calibrated using Bureau of Standard certified measuring vessels. The calibrated volume is indicated on the prover tank. A meter factor is determined each time the meter is proved, and this factor is printed on the run ticket and applied to the recorded volume measured by the meter. Besides giving a correction factor for computing the net volume run, the meter factor is a good check of the meter condition. As long as the meter factor remains relatively constant, the meter is in good repair. If the correction factor begins to vary widely, it is an indication that

the meter should be taken out of service and repaired.

In addition to the meter, the meter installation should include a strainer, an air and gas eliminator, and a means for proving the meter. Normally the oil will pass through a surge tank before passing through the meter on to the pipe line.

Tank Design Varies. Metering tanks used in the early LACT units were of the weir type, using standard lease tanks which had been modified. A standard lease tank was equipped with floats located in weirs at the outlet and overflow valves. Using the weir, a repeatable level for filling and emptying could be established. The problem with these tanks was that they had many of the same inherent errors that were found in manual gaging since they used the same type tanks.

Metering tanks used in the newer installations are based on the principle used for meter provers, and the dump-type tanks used for production tests of wells. Using this method a small tank of known volume is filled. When filled the tank is dumped, and the filling starts again. By counting the number of dumps and multiplying this by the volume of the tank, the volume of fluid delivered can be determined.

Size and construction of the metering tanks will vary according to individual company specifications and according to the quantity of oil handled by the lease. As in the P.D. meter installations, automatic temperature compensation is incorporated in the recording equipment so that net volume is obtained on the printed ticket.

Storage Tanks. Whether the oil is metered by P.D. meters or metering tanks, one or more lease tanks will be in the system between the metering equipment and the well to serve as surge and weathering tanks. In between the surge tank and the metering equipment will be a BS&W monitor. If the oil does not meet pipe line specifications, this monitor will shut down the metering equipment and divert the oil either to storage or back through the treating equipment. After the oil has cleaned up, the BS&W monitor will again direct the oil through the metering equipment to the pipe line. Provision is also made to automatically recirculate the bottoms in the storage tanks back through the treating equipment at times when the LACT unit is not in operation.

Temperature Records. In addition to the integrating equipment which automatically compensates for the temperature of the oil, most installations incorporate recording equipment to record the average temperature of the oil run. Where metering tanks are used, this provides a check of the volume since the temperature is recorded each time a dump is made, and therefore gives a record of the number of dumps.

BS&W and Gravity Check. In present installations the BS&W monitor serves only to keep bad oil out of the metering equipment. Determination of the BS&W for accounting purposes is still a manual operation. Continuous samples of the oil are taken and retained in an air-tight container. At the end of the month, these samples are checked manually. Gravity of the oil is also determined manually from these samples.

"Fail-Safe" a Must. All LACT equipment must be designed to "fail safe." All valves are of the type that are normally closed and opened only by an external signal or force. If power fails, whether electric or pneumatic, the lease will be inoperative. Also if any phase of the sequence is not operating properly, the sequence will be interrupted.

Safety Devices. Unless the following conditions are met, the lease will be inoperative.

- The pipe line clock actuates the starting mechanism.
- Oil in the storage tank is above a predetermined level.
- The BS&W monitor indicates pipe line oil at the storage tanks.
- All the monthly allowable has not yet been run.

To prevent running unmetered oil, all valves are interlocked so that filling and emptying valves cannot be open at the same time. Interlocking circuits will also prevent "dumping" partially filled metering tanks.

Float switches in the storage or surge tanks will shut down the lease if the automatic custody transfer equipment fails for any reason.

New Developments. Some new developments which are being watched closely are: simpler and cheaper methods of proving meters, automatic equipment for checking and recording BS&W and gravity, meters such as the mass flow meters.

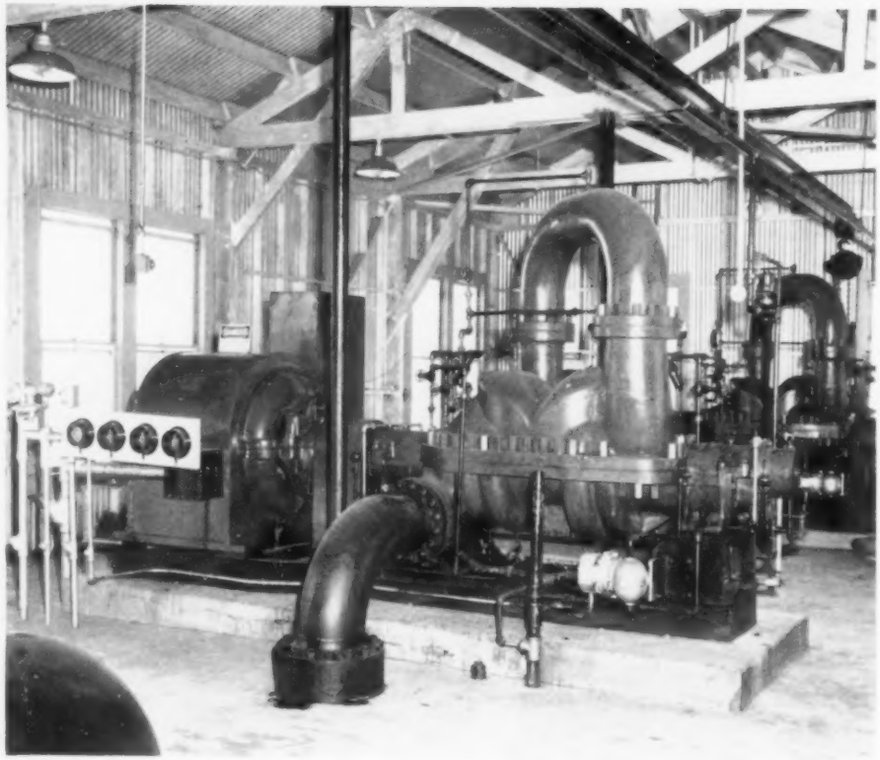
Lease automatic custody transfer is one of the main links in the ultimate complete automation of the petroleum industry. Possibly in the future transportation of oil will be completely automatic from the wellhead to the refinery. How long it will take to reach this stage, if it will ever come to pass, is unknown. Certainly development of dependable LACT systems will bring it closer to realization.

FIGURE 8—Control panel for LACT unit using metering tanks. Included on the instrument panel are recording gages for temperature and liquid head in the metering tank. These records serve as a check of the dump meter, since each time a dump is made the temperature and pressure will be recorded. Recording the liquid head gives a check to be sure the tank was full before dumping.

Installations now in service prove conclusively that accuracies as great or greater than manual systems can be obtained with a properly designed system. Future developments which will make automatic equipment simpler and cheaper should speed the conversion to unmanned transfer of oil from the producer to the pipe line.

ACKNOWLEDGMENT

PIPE LINE INDUSTRY thanks engineering and measurement personnel with Humble Pipe Line Company, Shell Pipe Line Company, Cities Service Pipe Line Company, Pan American Petroleum Company, and Phillips Petroleum Company for their cooperation in supplying data used in the preparation of this report.



Two remotely controlled units at Los Banos station. Mercury switches on panel at left automatically shut down unit in the event of high bearing temperatures. A lockout switch prevents further remote starting once a bearing-caused shutdown occurs. Unit must then be manually restarted. Both units are protected in a similar manner.

Automatic Control Advancements

3 Years' Experience Proves Unattended Station Design

High performance record resulted from careful attention to preventive maintenance routine. Close watch of telemetered operating data spotlights potential troubles before they occur.

By F. R. Rippingham and R. U. White
Pipe Line Department, Standard Oil Company (California) Pittsburg, Calif.

Standard Oil Company of California's Los Banos booster station is an unattended remotely controlled main-line pump station located centrally on an 18-inch pipe line between Kettleman and Pittsburg, Calif. The station, equipped with two 700-horsepower and one 800-horsepower electric motor-driven centrifugal pumps in series, was originally constructed in 1946.

In 1953 the station was converted to an unattended remotely controlled pump station by installation of control equipment on two of the pumps. Since the station was not operating at full capacity, it was deemed unnecessary to use the third pump on a remote control basis, and this has proven to be the case.

Remote operation was accomplished by code ringing over a privately-owned telephone system. The pumps may be started, stopped, or monitored by pushing a button at either Los Medanos tank farm at Pittsburg or at Kettleman. This automatically transmits the proper ringing code. Monitoring a unit is accomplished by remote connection of a telephone transmitter mounted above the unit involved.

Basic operation of the station briefly, is as follows: When a pumping unit is idle, both suction and discharge valves are closed and the pump is kept full of crude oil. A small relief valve on each pump prevents over-pressuring due to temperature increases. Upon receipt of the remote starting signal, both suction and discharge valves open and the motor will then start, providing all safety devices are in proper position.

If one or more of these devices is not in the correct position, the motor will not start and the suction and discharge valves reclose after a ten-second time delay. Protective safety devices will cause shutdown in case of:

- Low suction pressure
- High discharge pressure
- Excessive mechanical seal leakage
- High sump level
- High bearing temperatures
- Low voltage, or
- Motor overloaded

This article is not intended as a technical description of the Los Banos station; rather it is an attempt to analyze the operational and maintenance experience that has been gained in three years of remote operation.

Unusual Station Features. The Los Banos booster pumps are a vital unit in the operation of the Kettleman-Los Medanos 18-inch line. Efficient operation of the line in maintaining daily crude pumping schedule depends on their reliable operation. Necessary flexibility in pumping rates is obtained by operating the station pumps singly or in series operation.

Station discharge pressure is limited by case pressures of 670 pounds per per square inch on the smaller unit when operating singly and by maximum line pressure of 940 psi in series operation.

An unusual feature is that there is no automatic pump venting. Originally, we were reluctant to omit this feature because it had always been our practice to vent a main line centrifugal pump after it has been shut off the line. It has been found that by attempting to keep the pump full when shut down only a small amount of air enters the pump during the shutdown period due to popping of the temperature relief valve and leak-

General view of remotely operated booster station located on 18-inch line midway between Kettleman Hills and Pittsburg, Calif. Built in 1946, station was converted to unattended remote controlled status in 1953.

Dispatcher can check motor operation through "listener" located at remote stations.

age of the mechanical field; this air is quickly swept away after the pump is started.

On-Line Starting Without Surge. Another unusual feature is that the pumps are started with open suction and discharge valves with no throttling device between the pumps and the main pipe line. This was done only after considerable study was made regarding the pressure surges that would result from such a procedure, inasmuch as the motor reached full speed in several seconds. Actual experience has indicated no cause for alarm; no hazardous surges have been observed upon startup.

Normally, a station of this type would have a pressure limiting throttle valve in the discharge line to permit continuous operation at the maximum allowable pressure without over-pressuring the pipe line. This has been omitted at Los Banos because the added capacity obtainable by the use of a discharge throttle valve is not required. Such a valve would be indicated in a similar installation if maximum capacity were needed.

Flow rate is telemetered to both Los Medanos and Kettleman. Station pressure is telemetered to Los Medanos only. These data indicate to the dispatchers any unusual changes in line conditions or of a serious break in either section.

Start-Up Procedure. Pumps are started by the Los Medanos dispatcher on request by the dispatcher on the Kettleman end. The request may include starting of one of the two pumps individually or starting them in series. The dispatcher pushes the start button for the pump required, following which the starting is monitored by listening over the telephone line for the sound of the pump motor starting. The pump is then on the line and the telemetered flow and pressure readings reflect the starting. If two pumps are required the dispatcher waits for approximately two minutes and starts the second pump.

On occasions a pump fails to start after the start button has been pushed. From experience the dispatchers have found that the code rings may not have been properly spaced. Ringing the code by hand has frequently proved successful. If Los Medanos is unable to start the pump, Kettleman makes an attempt with their starting equipment. If neither is successful, the trouble is either in the telephone transmission, the power is off at the station, or a safety device has locked out. The trouble then has to be investigated.

Alternate Shut-Down Technique. Shutdowns are made at the request of the line dispatcher and the procedure followed is the same as in starting.

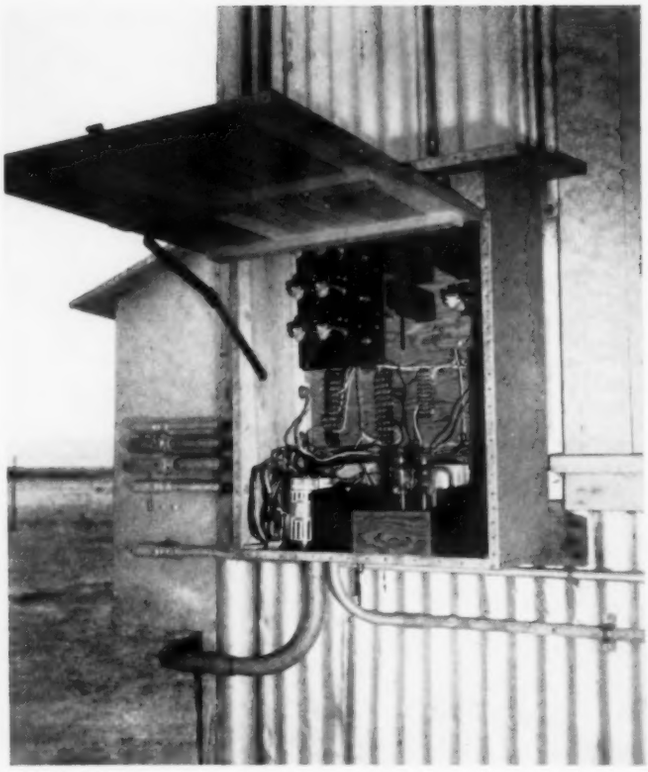
If pumps cannot be shut down remotely, due to telephone or power difficulties, Kettleman Station can be slowed down for several minutes, following which the low suction pressure device will shut the station down.

Safety devices have proved their worth on several occasions. Pumps have automatically shut down due to excessive mechanical seal leakage and high and low discharge pressures. Shutdowns have not occurred due to high sump level or high bearing temperature.

The dispatchers at Los Medanos, with the experience gained in operating Los Banos station remotely, have become very effective in diagnosing troubles which arise, all of which speeds up repairs if required.

Maintenance Program Simple. The entire maintenance of Los Banos Booster Station has proven remarkably simple. It is the practice to have a man make an inspection of the entire installation once a week. Travel time to the station consumes approximately four hours of the inspection day. The

Equipment inside starter house includes, at right, the main 2300-volt motor starters and, at left, control circuit relay panel.



Telephone signals to remotely operated station come into this relay panel, actuating circuits that, in turn, operate station.

station check consists of an inspection of: Sump level and operation, drain lines (including cleaning as necessary), motor and pump bearings and changing their oil, telemetering equipment, solenoid cooling water valves, water well and its mile long plastic discharge line, and the station cathodic protection system.

Since the equipment has been practically trouble free, this task is not so lengthy as might appear. Should trouble be noted by the inspection or by faulty remote operation, it is necessary to dispatch repairmen from the Los Medanos end of the line.

Preventive Maintenance Routine. A maintenance program, other than that indicated by the weekly inspection, has been developed and seems to work satisfactorily. It consists of the following:

- Change pump and motor oil every 1000 hours of operation.
- Check oil in gear boxes of electrically operated gate valve and lubricate valves every three months.
- Clean all electrical gear annually.
- Conduct periodic efficiency checks on station to indicate wear on pumps.

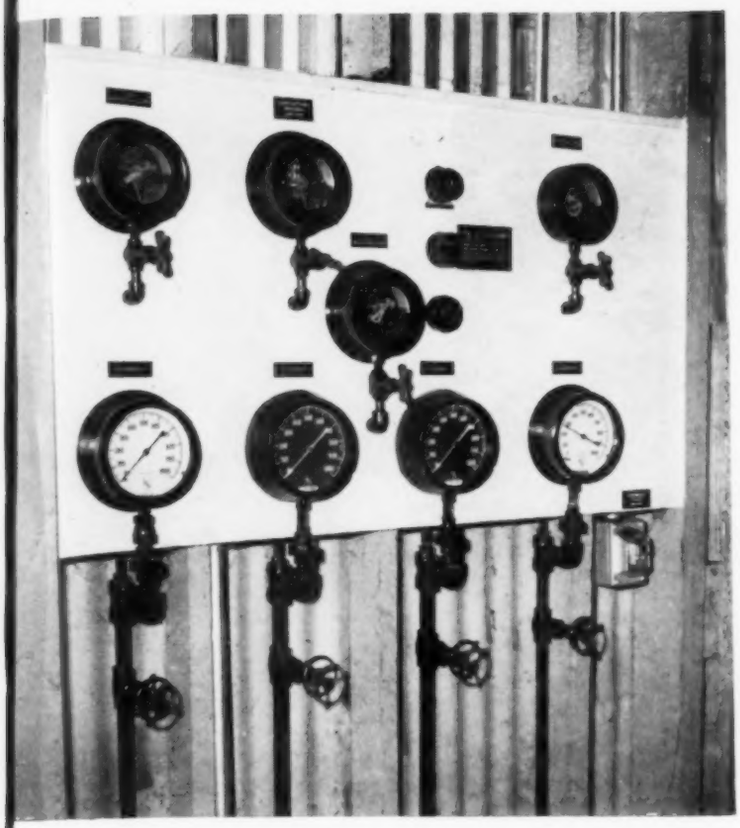
When this station was converted to remote operation, mechanical seal failure was recognized as one of the greatest hazards. Although the high degree of reliability of these seals has minimized this problem, there have been four cases of seal failure since 1953. Three of these cases were during a two months' period during 1955, during which time operational conditions made it necessary to mix a heavier and dirtier crude oil with the normal line stock.

During these pumpings the station was operating near or at its limiting line pressure of 940 psi and at lower than normal suction pressure. Of these three failures, all except one were on seals that had been in service for a long period of time. The fourth failure was on a seal of three years' service. All failures except one were on the highest pressure pump in series. This experience suggests that mechanical seal wear is accelerated in pumping conditions of considerable pressure variation. This is undoubtedly due to the fact that the spring pressures on the seals must be designed for certain ranges of pumping pressure and change of this range increases wear and strain.

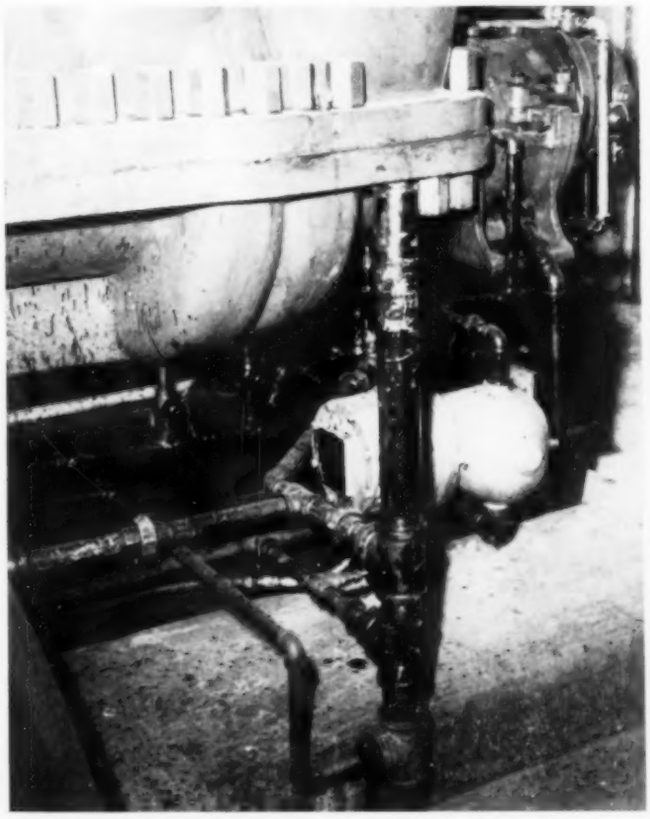
Gate Valve "Howler" Added. The above-mentioned seal failures brought about one of the few additions to the remote-operating equipment. When a seal failure has occurred, the human operator, located 95 miles from Los Banos, cannot be sure of the reason for shutdown or failure to start. He is generally suspicious that the telephone system may not be ringing the starting code correctly and, therefore, may attempt to start the pump several times. Since the electrically operated suction and discharge valves open each time a starting attempt is made, pressure is thrown onto the defective seal and might cause excessive oil spillage.

To remedy this situation a howler was connected to the gate valve mechanisms so that an audible signal is now picked up by the telephone transmitter while the valve is in motion. Thus, the howler signal indicates that the telephone code is reaching the station, and no further attempt is made to start the pumps remotely.

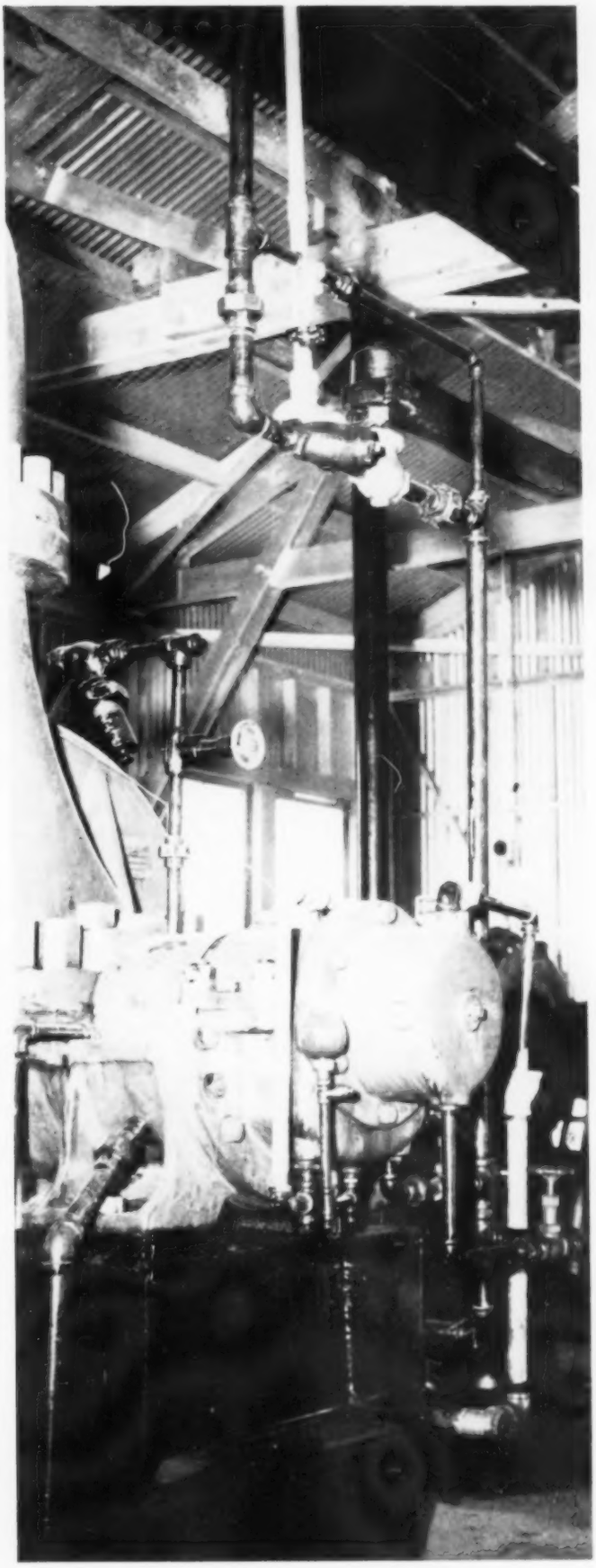
Drains Cleaned Weekly. Another minor maintenance problem encountered was the tendency of the oil drain lines to clog due to waxing, an inherent hazard with the type of oil boosted at Los Banos. Normal seal leakage passes through a float chamber and then to the sump through a small orifice. Excessive leakage fills the chamber and operates a float switch to shut down the pump. Clogging of the drain line



Instrument board with mercury switches (top) for low suction and high discharge shutdowns and, (bottom) visual pressure gages.



Should seal leakage, at either end of pump, become excessive, unit shuts down automatically. Oil leakage flows through float chamber (aluminum colored unit) and, when rate of leakage becomes excessive, float chamber fills and opens set of contacts which in turn shuts down the unit. Oil leakage flows into two-inch pipe, foreground, and on out to sump in yard.



Water control system for the water-cooled pump thrust bearing. When motor is started remotely, the solenoid valve (directly above bearing) opens, allowing water to circulate through bearing and on out to a waste water line. When unit shuts down, and after a preset interval of time, solenoid shuts off water supply. Both remote-starting units are equipped in this way.

to the sump, therefore, also causes the float chamber to fill. Weekly swabbing and flushing of the drains have eliminated this trouble.

Normal pump leakage, as previously mentioned, goes to a sump. An electrically driven gear pump, controlled by a float switch, returns the sumpage to the main line. Failure of the sump pump causes shutdown of the entire station. There has yet to be a failure of this type since the station has been remotely controlled.

Solenoid Controls Bearing Cooling System. Pump bearings at Los Banos station are water cooled. Originally, it was expected to allow a small flow to run continually during the hot summer months, however, solenoid valves have been installed to operate only when the pump is running. Water drains run to an abandoned water well, which also serves as an anode for the station cathodic protection system.

Piping Cathodically Protected. Since underground piping leaks are especially hazardous at an unattended station, it is felt that the station cathodic protection system is an important feature to remote operation. Since an abandoned well casing was available as an anode and electrical power readily available, the system was installed at a low cost. There have been no leaks during the past three years in the station piping.

Only One Major Overhaul Since 1946. In 1955, a check of station pumping efficiency indicated that wear of pump parts was enough to warrant internal inspection. The two pumps operating by remote control were opened and the pumps were overhauled. This has been the only major pump overhaul job since their installation in 1946.

Electrical Maintenance Low. From a maintenance standpoint, the electrical facilities have operated beautifully since 1953. A minor cleaning program annually has been sufficient to insure fine operation. Motor windings have presented somewhat of a problem because of slight bearing oil leakage and dust accumulation, but this problem appears to have been eliminated by the installation of felt seals between bearing housings and windings.

Undervoltage shutdown trouble also occurred during periods of high pumping rates but was corrected by replacement of the undervoltage devices on the starters with more modern models. The electrical equipment installed to effect remote operation has worked perfectly since its inception.

Telemetering a Maintenance Aid. As was expected, telemetering has proven to be an important key to both operation and maintenance. Of course, pressures and flow figures are necessary to insure proper operation and insure against pipe line leaks or breaks, but they also provide valuable clues to a maintenance man stationed many miles away. Since most trouble of a serious nature shuts down one or both of the pumps, a study of pressures and flow rates may indicate possible troubles.

In case of an unexplained shutdown, a check of telemeter recorders indicates if shutdown could have been caused by low suction or high discharge pressures, although this will be a rare case if operation is properly controlled. Power failure usually may be eliminated, if it is not the source of trouble, by calling the power company or checking operating conditions to see if any unusual conditions may have contributed to overload. If one of the two remotely controlled pumps will start, high sump is eliminated.

An attempt to restart after a period of time will show if bearing overheating is the cause. By use of these various means of elimination and by means of acquired knowledge of the station's performance, it is usually possible to diagnose the trouble closely from a distant point.

The telemetering equipment at the station has proven very dependable and maintenance has consisted of a small amount of adjustment and an occasional cleaning of the oil lines from the orifice fitting.

Lower Upkeep Anticipated. Actual maintenance expense during the three years of remote operation has been roughly the same as previously. However, this expense reflects seal replacements during a period of difficult oil handling not previously encountered in the station's life, and an overhaul of pumps that undoubtedly will not have to be repeated for at least another ten years.

The Los Banos Station is at present in an optimum maintenance condition, perhaps the best in its history. Therefore, we believe that the maintenance expense will be lower during the coming years than prior to remote controlling. Other installations of automatic equipment have indicated that this type of operation produces less maintenance trouble than manual operation because of closer control at all times.

As may be deduced from the foregoing analysis of our experience with remote controlled operation at Los Banos, the station has fulfilled all design hopes with remarkable efficiency. Actually, its operation and maintenance from a remote point have proven simpler than originally was anticipated.

Remote operation's flexibility has made dispatching of the line simpler and its operation more efficient, thereby decreasing the unit power costs slightly. A case history of this plant indicates that this type of operation is extremely dependable, and that it is economically desirable. Therefore, we consider this pump station's general performance to date is considered as a positive attestment to the practical value of full or partial automation of pipe line facilities.

—The End

About the Authors

Rippingham

White

F. R. Rippingham is Northern District superintendent in the Pipe Line department of Standard Oil Company of California, Western Operations, Inc. Since joining Standard in 1923, he has worked as a gager, foreman, deliveryman and district foreman in various locations throughout the Pipe Line department. He was appointed to his present position in 1954.

R. U. White is Northern District foreman in the Pipe Line department of Standard Oil Company of California, Western Operations, Inc. After receiving a B. S. Degree in civil engineering from the University of California in 1943, he served in the South Pacific with the Seabees and in 1946 was employed by Standard. He has worked in various Pipe Line department locations and received his present assignment in 1954.

Do You Deserve a Promotion?

Here is a checklist that will give you a candid appraisal of your personal traits.

ONE OF THE toughest assignments facing any executive is to decide which one of several employes is to be selected for promotion. Aside from the desire to be as fair as possible he must also be certain that the best possible man from the standpoint of value to the company will be selected.

Here is a method being used by a number of oil company executives. They use a promotion check chart such as that shown in the accompanying illustration. Each factor is balanced for the individual under consideration as to positive possession, uncertainty or failure to possess the desired quality. Two points are scored for those in the first column and one for those in the second (none for the negative checks). The various totals arrived at for each of the employes being checked serve to spotlight the individual possessing the best potential for the new staff position.

Points to be checked vary from one company to another. We have selected herewith 50 of those which appeared most often in a wide number of such lists studied. The reader may use all or any number since different factors will apply to different staff positions under consideration. Keep your own score and see how you rate.

1. Keeps quality of present work exceptionally high day in and day out.
2. Is continually improving his own knowledge of the company operation.
3. Knows what to do in average situations without being told.
4. Has always been willing to share in unpleasant work or unpleasant aspects of the job with other employes.
5. Is good at routine; has shown a knack for following established patterns.
6. Is not fixed in his ways of doing things and has shown willingness to alter previously established methods.
7. Has the ability to learn new methods and shows positive interest in doing so whenever possible.
8. Has demonstrated orderliness in his present work.

PROMOTION CHECK CHART

Number	Positive (2)	Neutral (1)	Negative (0)
1			
2			
3			
4			
48			
49			
50			
Totals	____ x2 = ____	____ x1 = ____	____ P plus N ____

The above chart may be used in analyzing each individual with respect to points set forth in the accompanying article. The number of lines used will be determined by the number of points applicable. As an example, if all 50 are used and 38 checked positive, that would total 76 in the first column; 10 checked in the second column would give a score total (P Plus N) of 86 since the remaining 12 in the third column would carry no score.

9. Possesses adequate knowledge of details of his present job.

10. Has shown a definite interest in receiving a promotion and wanting to climb in the company organization.

11. Requires a minimum of instruction for any ordinary work assignment.

12. Can think things out—does not need minute detailed explanation of what to do on every assignment.

13. Has shown no inclination to "goof off" at the job now held.

14. Has a good record of past work performance.

15. Takes good care of his personal health in private as well as on the job.

16. Has a record on the present job of a minimum of errors of judgment.

17. Can do every regular assignment without needing close supervision.

18. Does not give alibis or excuses for failure to do his work.

19. Has a general attitude of cheerfulness at his present job and around others.

20. Shows seriousness at his work; has demonstrated a minimum of "horse play."

21. Can do his present job without physical or mental strain.

22. Demonstrates patience with others in connection with his work; both those above him and at his own level in the organization.

23. Is able to pro-rate his energies throughout the day and keep at top efficiency all through.

24. Has demonstrated a positive interest in the pipe line field in the past.

25. Has demonstrated loyalty to the company in the past.

26. Knows how to get along with supervisors in his present job.

27. Possesses the ability to concentrate on a given problem and solve it effectively in a minimum of time.

28. Seeks and does additional tasks connected with his job without their being assigned directly to him.

29. Is respected by the men and women with whom he has worked.

30. Can stand criticism from superiors as well as fellow employes without being hurt or showing resentment.

31. Is usually pleasant and cheerful as a natural personality trait.

32. Willingly conforms to the rules set for employe conduct.

33. Does not become flustered or embarrassed easily.

34. Has personal long range plans for his career and has worked toward them in the past.

35. He can take criticism given to him and show profit thereby following such criticism.

36. Is willing to accept responsibility when things go wrong on the job.

37. Has pleasant personal habits and traits.

38. Is settled in his personal life away from the job and in relationships with others.

39. Is able to work with and get along with both sexes among employes.

40. Has no fixed prejudices in his personal thinking.

41. Has learned all of the basic fundamentals of his present job and shows possibility of doing so easily on the job under consideration.

42. Has full appreciation of the principle that the company must make a profit and how it is done.

43. Lives within his means and successfully manages his money problems on his present income.

44. Has the necessary background and education to handle the next step up the ladder.

45. Has developed good outside interests in his life to offset any job tensions which develop in his work.

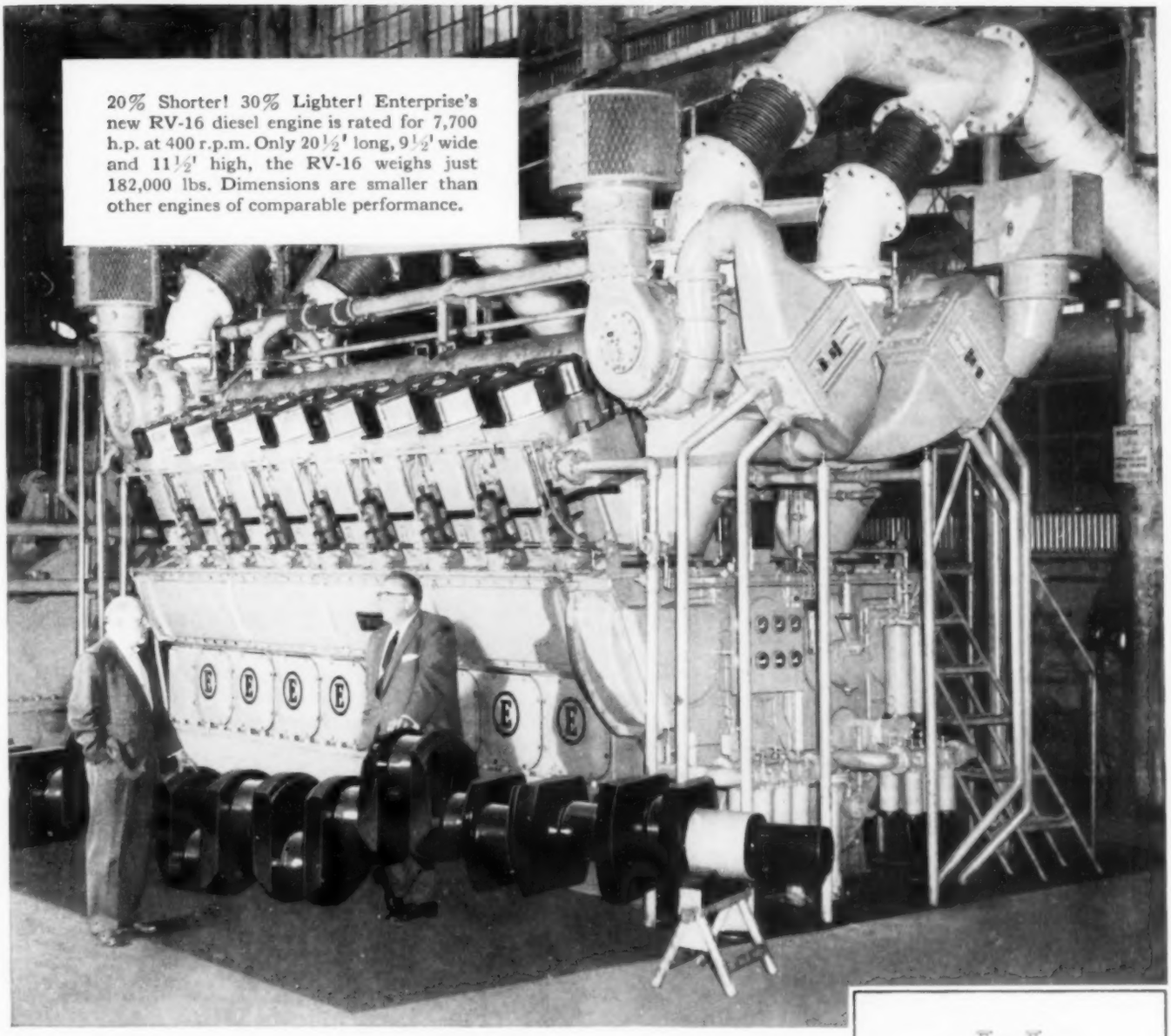
46. Has demonstrated willingness to help others who lack his own capabilities.

47. Has demonstrated self confidence and assurance both on and off his present job.

48. Has refrained from obvious apple polishing; a sign of personally admitted shortcomings.

49. Has expressed confidence in the firm as being a fine company.

50. Has shown no signs of unstableness in political or economic thinking in the past.—**The End**



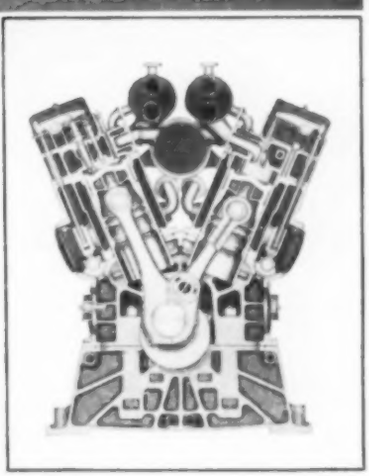
20% Shorter! 30% Lighter! Enterprise's new RV-16 diesel engine is rated for 7,700 h.p. at 400 r.p.m. Only 20½' long, 9½' wide and 11½' high, the RV-16 weighs just 182,000 lbs. Dimensions are smaller than other engines of comparable performance.

Enterprise Chooses KOPPERS Piston Rings Exclusively for RV-16

Prototype of a new line of industrial diesel engines, the RV-16, built by Enterprise Engine & Machinery Co., of San Francisco, is designed for such rugged operations as delivering main propulsion in towboats and seagoing freighters, or supplying power for pumping stations or electric generation.

As many other leading manufacturers have done, Enterprise has selected Koppers Piston Rings exclusively. Koppers wide range of types and sizes . . . variety of material selection . . . control of material quality . . . close tolerance performance . . . rigid standards of inspection—all contribute to Koppers leadership in the field of industrial piston and sealing rings, making Koppers the most dependable source of supply.

If you have a problem of ring application, avoid further needless expense. Take advantage of Koppers experience, research facilities and craftsmanship. Write for information today. KOPPERS COMPANY, INC., Piston Ring and Seal Department, 7211 Hamburg Street, Baltimore 3, Maryland.



Cutaway shows internal design of the RV-16

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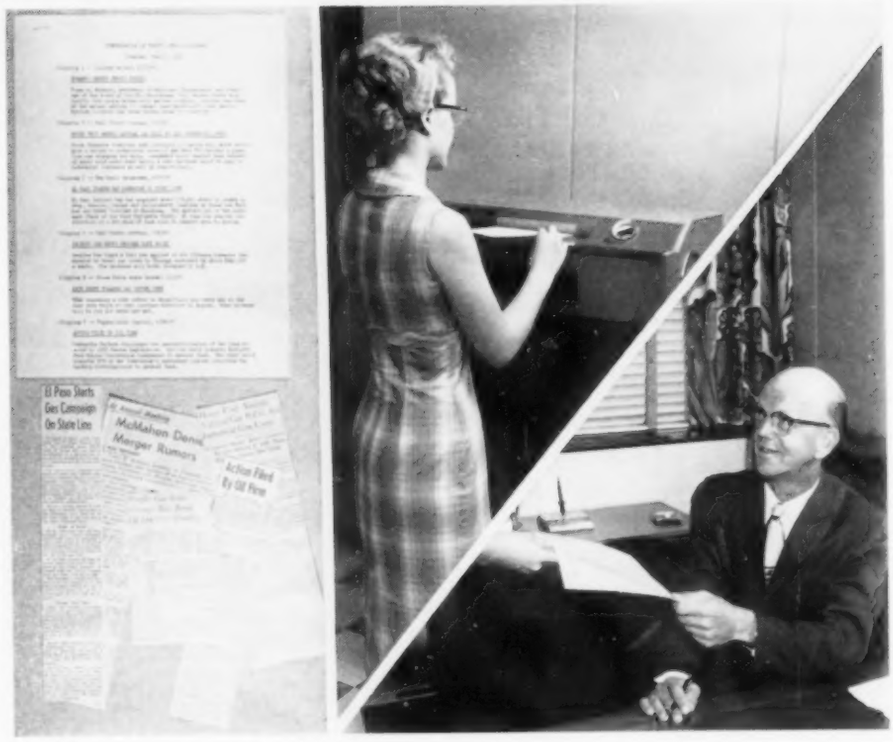


FIGURE 1—The Daily Condensation News Clippings prove to be a real timesaver for the executive. Left to right . . . a copy of the condensation sheet, a special dry-process copying machine reproduces a clipping, and within minutes the copy of the clipping is delivered to the executive requesting it.

Getting the Word Around

Here are the information channels Northern Natural users to keep people informed both within and outside of company operations.

By James J. Finnegan

Northern Natural Gas Company
Omaha, Neb.

THE PIPE LINE industry is keenly aware of the importance of the printed word. One concrete example is the tangible growth in both quantity and quality of company employe magazines.

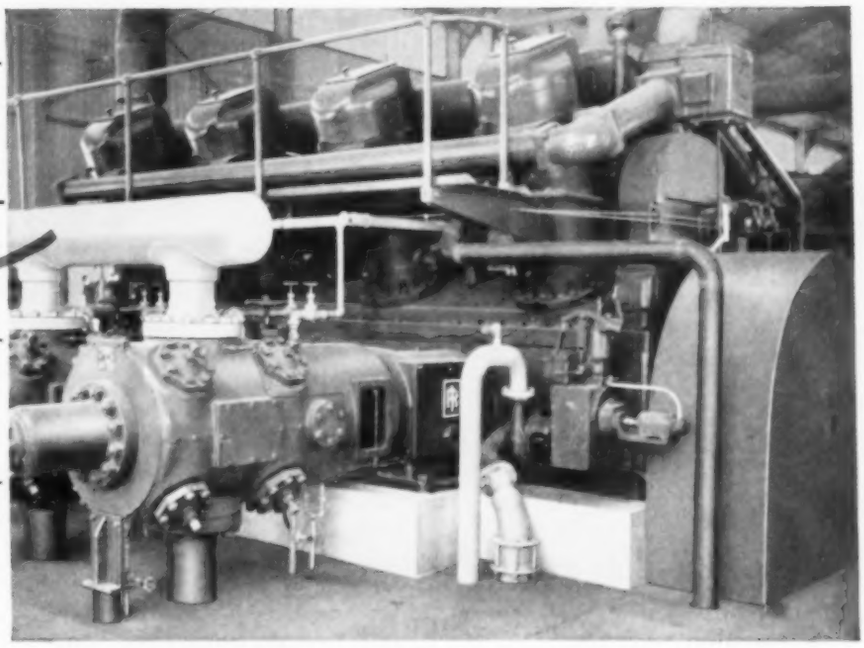
Although employe publications are of vital importance to any company, this one medium does not constitute a complete day-to-day communications program. The entire approach must be much broader. Every possible means should be explored to extend the industry's communications avenues.

There are many excellent ways to supplement employe magazines. In fact, Northern Natural Gas Company is using more than a dozen channels of information to tell its story to employes, customers, stockholders, the industry and the general public. Some of those channels include:

Use of Bulletins. There are three regularly scheduled bulletins, two on a daily basis and one weekly.

For nearly eight years, Northern has published the *Daily Bulletin* for its officers, department heads and certain key advisors, both in the headquarters and in the field. This bulletin carries items about Northern's business activi-

A NEW HIGH FOR I-R GAS-ENGINE COMPRESSORS



One of seven KVG Gas-Engine Compressors at Big Piney Station of Pacific Northwest Pipeline.

Seven KVG Units at 7,325 ft. altitude deliver gas from **BIG PINEY FIELD** to Pacific Northwest Pipeline

The Big Piney Station of the new Pacific Northwest Pipeline system is of special interest for two reasons.

Located at an elevation of 7,325 ft above sea level, it is the highest pipeline compressor station in the country—operating in temperatures ranging down to 40° below zero.

It has made possible the commercial utilization of Big Piney Field, which has been shut in for the past 18 years by lack of transportation facilities.

Hence it was quite appropriate that opening ceremonies for the Pacific Northwest Pipeline were held at Big Piney—where seven Ingersoll-Rand KVG Gas-Engine Compressors boost field gas to pipeline pressures. Two 880-hp units and two 660-hp units operate with intake pressures of 100-350 psi and discharge pressures of 400 to 550 psi. Three more 660-hp units have intake from 400 to 550 psi and discharge pressures of 650 to 850 psi.

Because of the extremely high altitude, the gas engines were supplied in bigger-than-normal sizes. Combined rated horsepower of the seven Big Piney units would be 5,060 hp at normal 1,000 ft altitude—for an actual load of about 3,885 hp under average conditions. The station is completely "winterized" for dependable operation at sub-zero temperatures.

Ingersoll-Rand Gas-engine Compressors now serving the various stations of the Pacific Northwest Pipeline include the following types and sizes:

SVG compressors, 330 hp
KVG compressors, 660 and 880 hp
Turbocharged KVS units, 1000 and 2000 hp
PKVG Gas Engine Power Units, 1100 hp

For maximum stability, flexibility and long-range economy under all pipeline conditions, it pays to specify Ingersoll-Rand four-cycle gas-engine compressors. Your I-R representative will gladly give you complete information on the units best suited to your needs.

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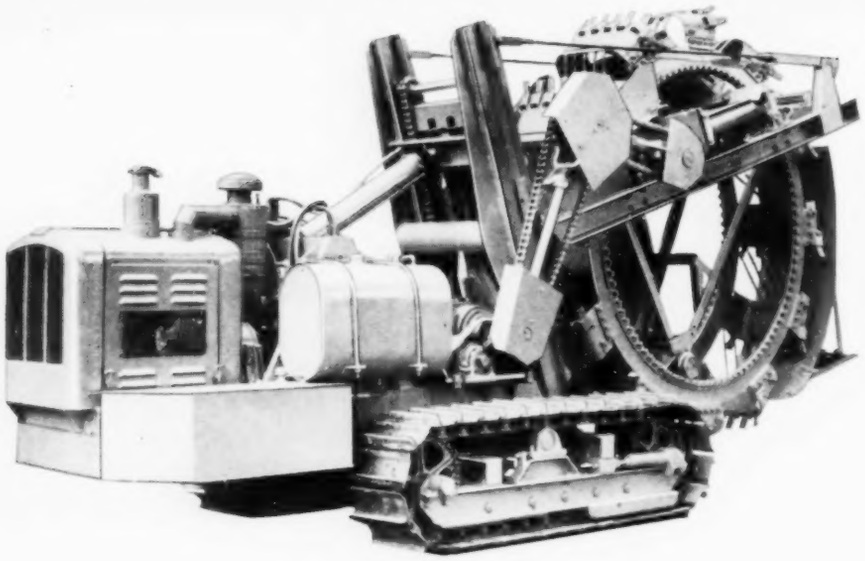

with NEW 170 wide-wheel Trenchliner

- wide wheel frame — cutting widths from 20 to 32"
- maximum digging depth 5'9"
- hydraulically-driven conveyor — belt speeds independent of digging wheel speeds
- 30 digging speeds from 12" to 25 lineal feet per minute
- heavy-duty cast-steel buckets
- double-point "Tap-In" teeth — self-sharpening, reversible
- quick-change gumbo buckets
- retractable bucket-cleaner
- hydraulic wheel-hoist on power-tilt mast
- standard tractor crawlers — 16" grouser-type treads, or 12" flat shoes optional
- choice of gas or diesel power
- all main gears enclosed in oil bath; all main shafts on antifriction bearings

Now, another wheel-type Trenchliner joins the big Parsons line — a new 170, with extra-wide wheel frame. Developed to meet the demand for wide work range in a medium-size machine, it digs up to *32 inches wide,* at depths to 5¾ feet. With all this extra capacity, you get smooth, positive wheel control.

Hydraulic power raises and lowers the wheel on vertical mast with fractional-inch accuracy — and tilts the mast for traveling or trailer-loading. New hydraulic control system on conveyor gives belt speeds up to 600 feet per minute — *completely independent of digging wheel speeds.* Belt easily handles maximum yardages from the extra-wide wheel — puts spoil bank well back beyond edge of trench. Better have Parsons distributor demonstrate what this new 170 will do for you!

Other sizes range from a smaller wheel model to "big-inchers" and "middle-inchers" — also, ladder-types on crawlers, and on rubber.

mail to: PARSONS Company, NEWTON, IOWA

Send us more information on new 170 wide-wheel Trenchliner

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ties as well as other companies within the industry.

One of the newest members in Northern's program of communications is the Daily Condensation of News Clippings. (See Figure 1.) This is a comparatively new medium of company communications and one that seems to stir a great deal of interest in the field of communications.

Before the Daily Condensation sheet, Northern handled the clipping of newspapers in the usual fashion. Newspapers were read each day and items of interest were clipped and routed throughout the company. What with the busy schedule of some executives and the fact that they were frequently out of town, there would often be long delays before the fourth or fifth person marked to get a clipping would receive it. Consequently, the news value was lost.

This situation led to the development of the Daily Condensation of Clippings. Each day some 40 daily newspapers from Northern's area of operations, plus an additional number from around the country, are read and particular items of interest are clipped. Now instead of being routed, these clippings are condensed by a member of the public relations department and the brief condensations are then mimeographed for distribution to officers, department heads and other key supervisors in the headquarters office.

If the readers are interested in any one of the clippings they can contact the public relations department and request a copy of the original clipping. The department maintains a dry-process reproduction machine which can reproduce the clipping in seconds. Copies can be delivered within minutes of a request. At the present time this service is averaging almost 100 requests a week for copies of clippings.

Weekly Bulletin Helps, Too. The weekly bulletin is sent to key executives within the utilities companies served by Northern. It is mimeographed on a brown-toned color stock so that it will be easily recognizable to the utility executive when it reaches his desk top. The bulletin is part of a continuing effort to build and maintain good customer relations. It not only carries business items about

NOV 19 1957

What You Should Know About . . .

Federal Control of Natural Gas

Our federal government has taken a big new stride toward socialism. Since June of 1954, by Supreme Court decision, natural gas producers have been controlled by a government agency—the Federal Power Commission.

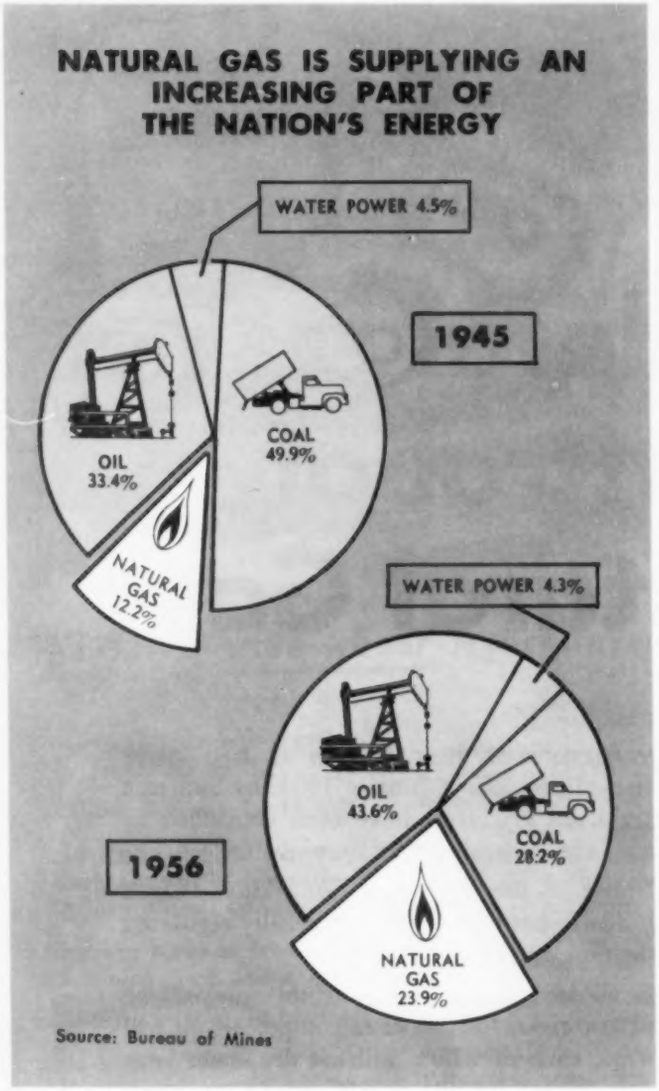
This is the first time in the history of our nation that a highly competitive industry has had its prices federally regulated at the point of production during times of peace.

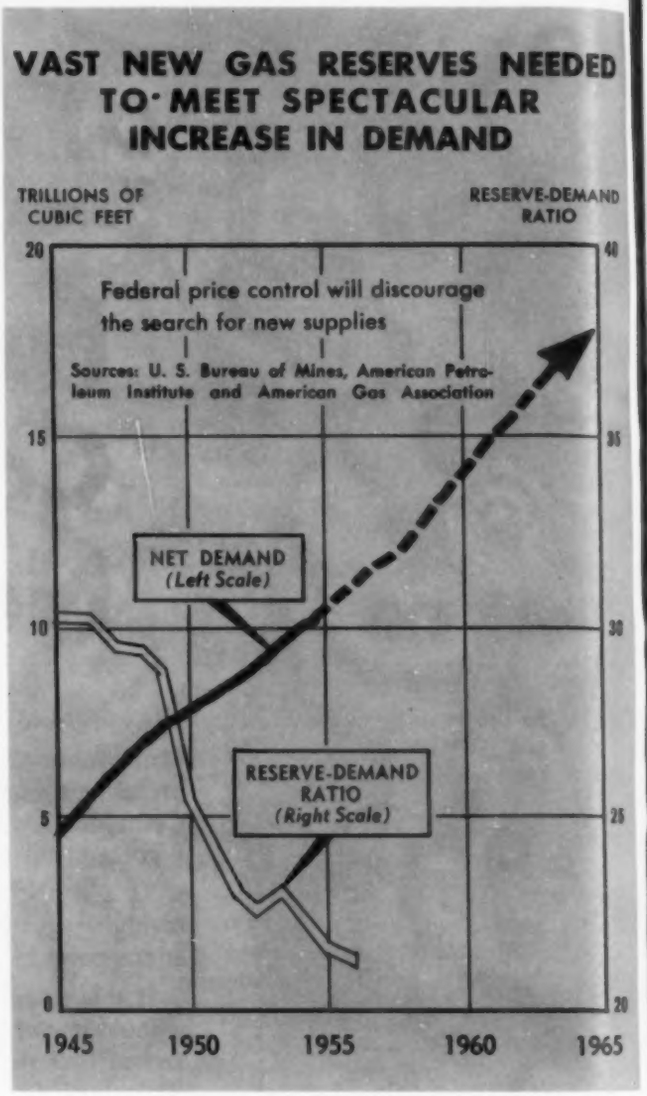
If this situation is allowed to continue, you not only will be without one of your basic rights—freedom to compete—you will lose in four more ways, each of which will eat deep into your pocketbook:

- U. S. natural gas supply will dwindle.
- Industry will move to gas areas.
- Gas prices will go up.
- Your tax burden will increase.

In the long run, the public will be the loser . . .

Supplement to the November, 1957 issues of
WORLD OIL and PIPE LINE INDUSTRY
By Don E. Lambert





Supply Will Dwindle

The demand for natural gas seems to be insatiable. While some 60 percent of the householders in the Southwestern producing states rely on natural gas, only 15 percent of the homes outside that area have been able to obtain it so far. A tally of major cities shows several hundred thousand householders on the waiting list.

Since 1945, demand for natural gas has doubled, while proved reserves increased by only one third. Demand is expected to continue rising at the same spectacular rate in coming years. By 1965, U. S. natural gas demand is expected to reach 17 trillion cubic feet annually, compared with 11 trillion cubic feet in 1956. Vast additional new gas supplies must be found to satisfy higher future demand. Yet, if federal control is allowed to continue the consumer can expect to have less gas available, not more. Why?

It is impossible to have a flexible and responsive fuel economy with oil and coal freely competitive, while gas producers' prices are fixed by regulation.

Presumably the purpose of the plan to fix the producer's price of gas is to establish it somewhere below that which would be established by competition.

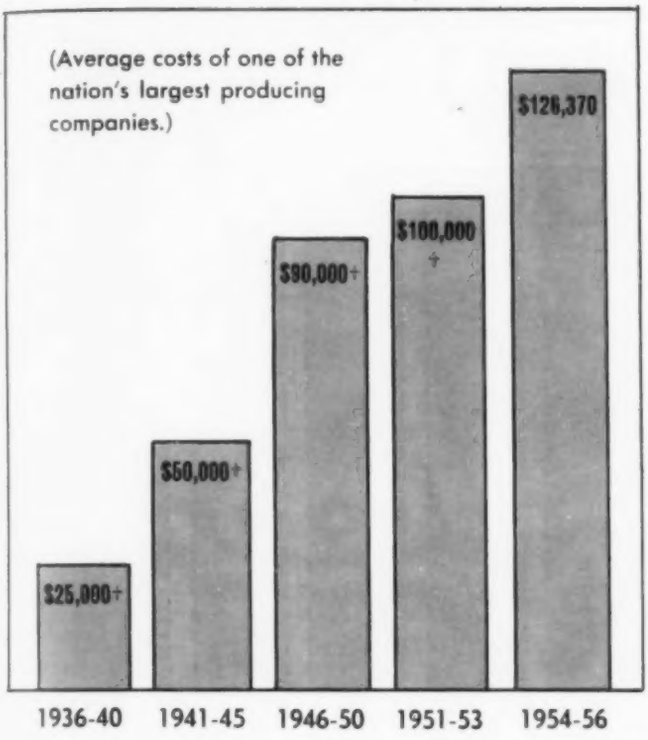
What are the effects of such regulated low price? It would tend to sharply increase the number of customers desiring to use gas. By the same token, it would tend to lower the demand for oil and coal.

However, the low price would lessen incentive to explore for and develop natural gas. There would not be enough gas to supply increasing demand. When a gas producer drills exploratory wells, industry experience tells him that, on the average, he will drill eight dry holes before he hits one that produces. Dry or not, many of these wells will cost him around $100,000 each, and some will range up to $1 million. Drilling costs have risen sharply (See chart, page 3), and now are five times larger than before World War II. Gas producers must receive sufficient prices to offset rising costs.

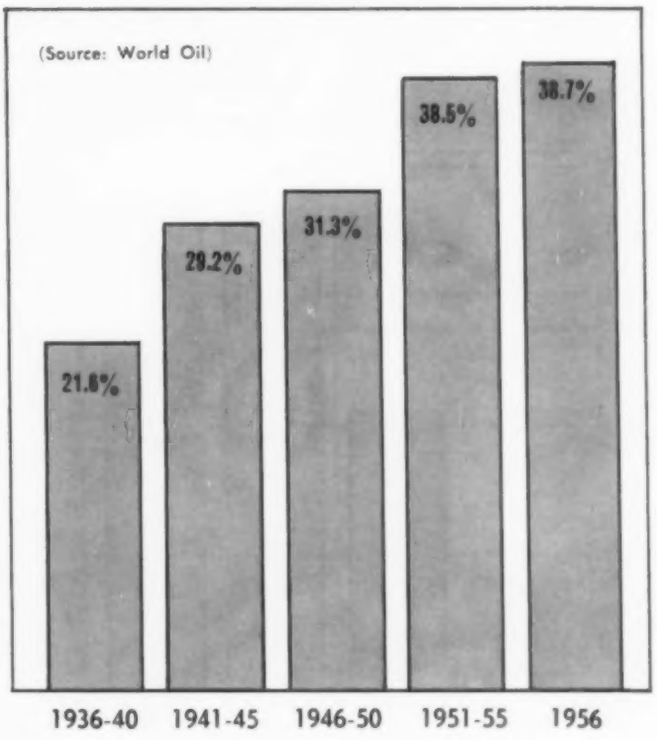
Subsequent production of underground reserves discovered by the successful exploratory well must of course compensate for exploration and drilling of the eight dry holes. But, when financial risks are great and rewards are limited by federal price fixing, the risks simply aren't worth taking—so the discovery and development of new gas supplies will inevitably be retarded.

In addition there will be a growing trend on the part of producers to sell their gas within the state where it is produced, so as to avoid price controls. Thus, supply

COST OF DRILLING AVERAGE WELL IS FIVE TIMES GREATER TODAY THAN PRE-WAR



IN ADDITION TO RISING COSTS, LARGER PROPORTION OF WELLS DRILLED ARE DRY



If adequate natural gas supplies are to be available to meet the nation's rising future needs, producers must receive a fair market price to offset the inflationary rise in labor and materials and larger dry hole losses.

to consumers in non-gas producing states will be further diminished.

With natural gas in short supply, the distributor will be forced either to prorate his deliveries to your home causing great inconvenience, or to cut off service entirely, forcing you to install new facilities and shift to coal or oil.

Thus, the primary interest of you, the consumer, is defeated. You will be deprived of a dependable supply of natural gas; and those of you who have been hoping, by extensions of service, to become gas customers will be doomed to frustration.

Prices Will Go Up

As was outlined above, under federal control the natural gas producers' efforts to find new reserves and to sell their product in interstate commerce will decrease. Supplies will dwindle. As demand increases, the consumer price can go nowhere but up!

Even so, the advocates of federal control often tell the gas customers it means lower prices.

Nothing could be farther from the truth. As the underground reserves now connected to interstate pipe lines are used up, and new supplies are not available, there is going to be that much less gas going through the lines and through distribution facilities to the consumer. Since the expense of transmission and distribution remains about the same even where less gas is involved, the individual consumer will have to shoulder the same amount of that total expense by paying a greater amount per unit of gas.

Under federal control, you will pay more for natural gas, not less.

You Will Have Other Cost Burdens

The cost you will have to bear under regulation is increasing in two additional dimensions:

Higher Tax Load. The budget of the Federal Power Commission has increased more than $1 million annually. The number of employes has increased from 624 in 1954 to 739 at present.

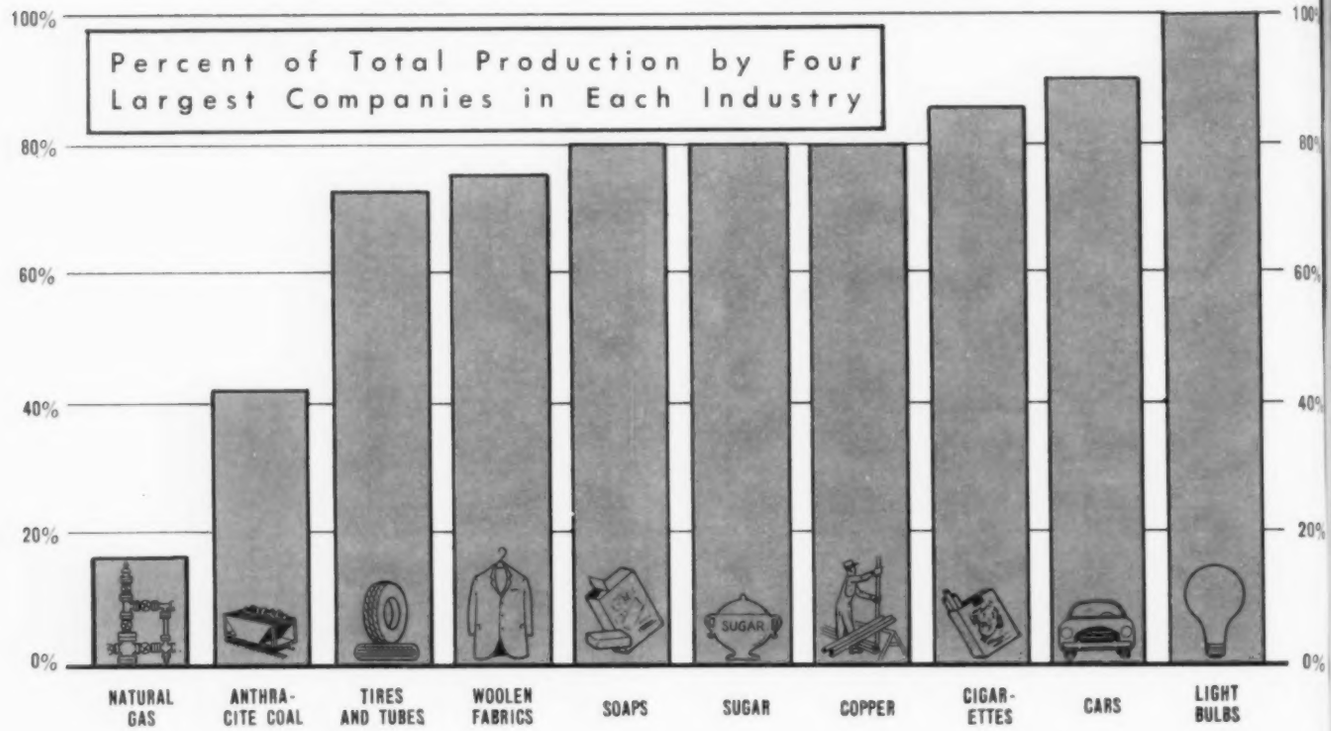
The Commission, in hearings on the 1958 budget, requested a further increase in the budget to $6,477,000 and 49 new positions. The House Committee on Appropriations denied this increase and held the budget at the 1957 level except for the retirement fund provision.

The cost of regulating must be paid from tax revenues.

Higher Operating Costs. The regulatory expense incurred by the companies, which is recognized and included in rate determination, is increasing to alarming proportions. Inquiry was made of six independent producers maintaining separate records of out-of-pocket cost incurred because of regulation. They reported their expenditures and their sales in interstate commerce for the year 1956.

Total additional expenditures because of regulation were $1,966,000 to handle sales in interstate commerce of 1.1 trillion cubic feet. Applying this rate to interstate

NATURAL GAS PRODUCERS ARE MUCH MORE COMPETITIVE THAN OTHER MAJOR INDUSTRIES



volume of approximately six trillion cubic feet in 1956, the estimated annual out-of-pocket cost of regulation to natural gas producers has already reached $11 million.

This is a high cost to saddle upon the consumer. And it is just the beginning. There is no recognition of executive time, office space, office personnel and supplies or overhead. If the present form of regulation continues, inevitably it will be necessary to provide separate offices, staffs and executives to handle regulatory matters.

You, the consumer, will have to pay the cost.

Industry May Re-Locate

Natural gas producers are not subject to federal price fixing if they sell within the state where it is produced. Instead, they are able to compete for a fair market price determined in an atmosphere of free competitive enterprise. They are not bogged down with the bulky and costly paper work that is required by the FPC.

As a result, natural gas producers are forced to take advantage of every opportunity to increase the sale of gas within the state where it is produced. Realizing this fact, a growing number of large industries are picking sites in gas producing states. They are protecting themselves against the danger of having to shut down a costly plant because of the producer's possible future inability to serve them.

The industry trend to gas producing states is clearly illustrated in the following statistics; Texas, Louisiana, Oklahoma, New Mexico and Kansas have 88 percent of the proved natural gas reserves, and produce more than 80 percent of the gas that is marketed in the U.S. These same five states on the average, already use 50 percent of the ga they produce within their own borders, completely outsid the jurisdiction of the FPC. That leaves only half of th total supply to be distributed among the remaining 4 states. The competition is already keen, and if supplie dwindle, will become even greater.

To give another example, 27 years ago Texas markete within its own borders only 25.7 percent of the natura gas it produced. The percentage was 52.1 in 1955. Als in Texas, one aluminum plant and one chemical factor together require as much gas as is supplied to all th homes in Detroit, Milwaukee and Kansas City com bined.

A vast, new and growing industrial empire has bee built up in the Southwest where gas is plentiful at rea onable rates—lower than elsewhere because it does n cost as much to deliver it.

If you live in a non-gas producing area, the effects this trend will be felt deep in your pocketbook. The eco omy of your area will suffer if industry is deprived natural gas and is forced to convert to other more ex pensive fuels or move factories to the gas producin states. This would lead to the dislocation of many peo ple, who would be forced to sell their homes and see employment in gas producing states.

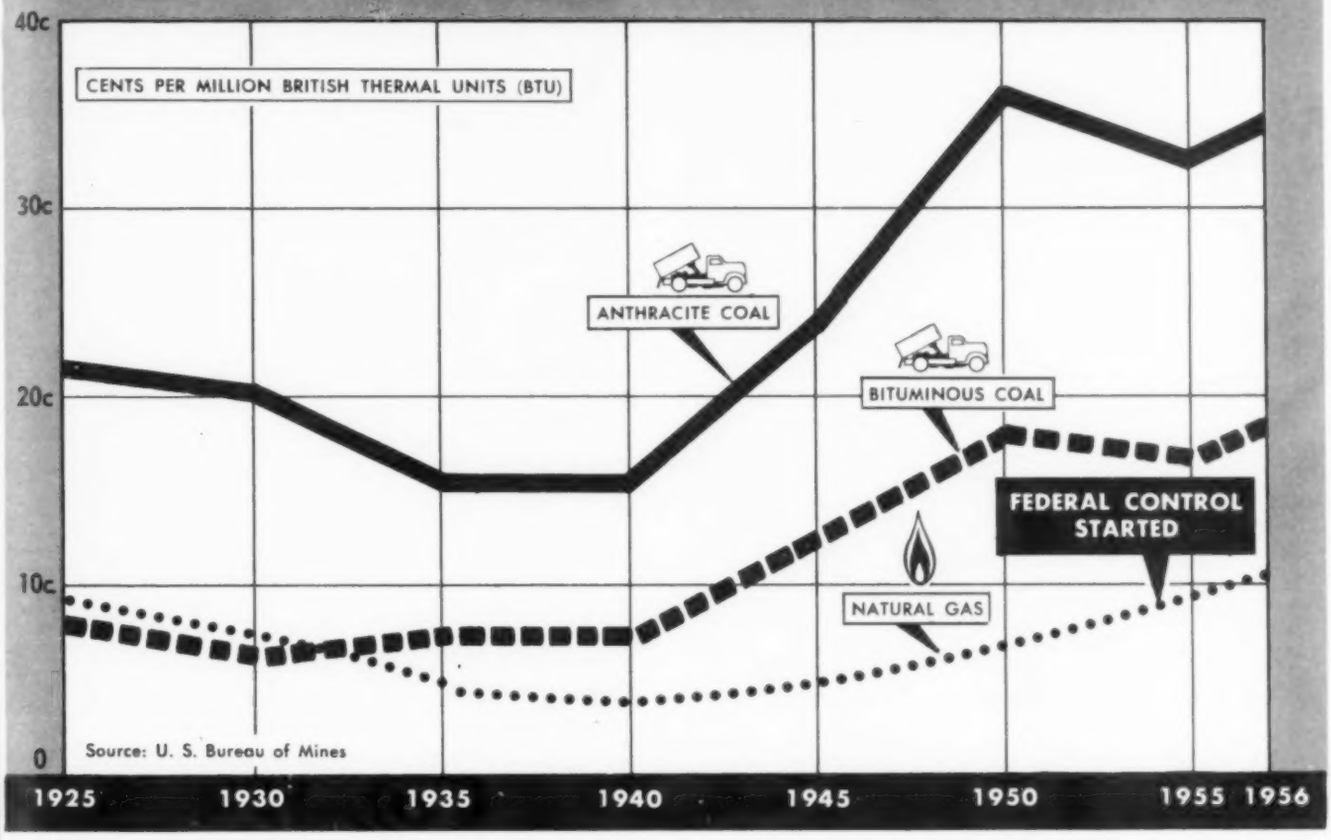
Natural Gas Is Just the Beginning

Natural gas production is no mysterious business operating by magic. It obeys the same economic laws as the businesses of producing all other commodities.

If the natural gas producer becomes subject to regu

For More Than 20 Years–Without Federal Control–Natural Gas Cost Less Than Any Other Mineral Fuel at the Point of Production

WHY SHOULD IT BE REGULATED NOW?



lation as though he were a public utility, and if he must sell his product at a price fixed by a federal regulatory agency, no producer of oil, or coal, or solid minerals, or cattle, or products of the soil, or steel, or automobiles, or manufactured supplies, or other commodities will be safe from similar price fixing.

Should federal control be allowed to continue, there would be nothing to stop a series of similar steps to control producers of other commodities. This is the first step toward socialism. And, as Churchill said, "Socialism did not abolish poverty in England—it only distributed it."

Socialism destroys—Freedom creates.

You will be the loser under federal control. It will pay you to take action to bring about an understanding of the problem and to secure corrective legislation. To accomplish this, you should know how the gas industry operates and why it should be left free to operate without federal regulation . . .

Three Distinct Divisions

Sometimes found alone, sometimes with oil, natural gas comes from underground reservoirs which are continually being depleted by heavy usage, so creating a continual demand for new discoveries.

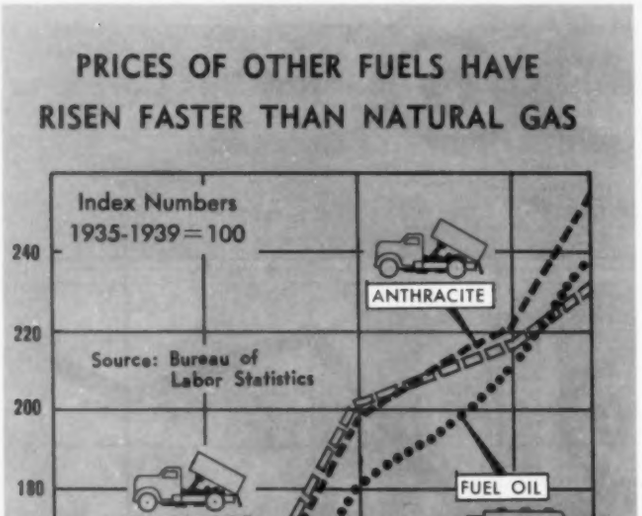
When the underground gas is brought to the surface, processing of various kinds takes place--including removal of natural gas liquids and oil. Some of the processed gas is held for local residential and industrial purposes. The balance is fed into pipe lines which may extend more than 1000 miles into non-producing areas, there to be distributed by local gas companies.

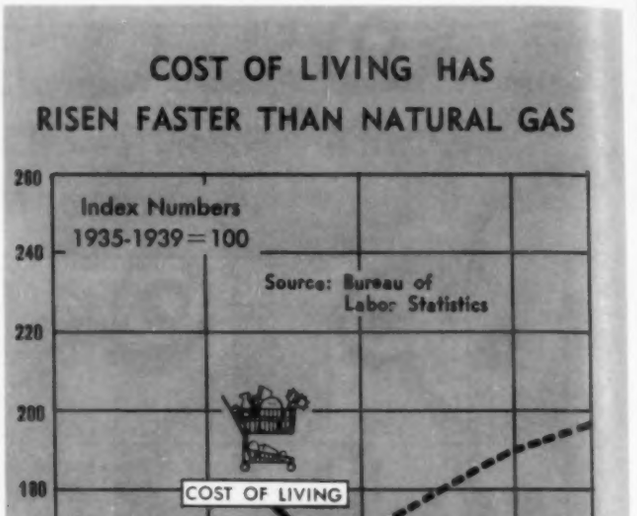
Usually, the job of getting gas from well to consumer falls to three separate groups: the producers who get it out of the ground, the pipe line operators who transport it to market, and the distributing companies who deliver it to the ultimate customer. Producer sells to pipe line, pipe line to distributor, and distributor to consumer.

Interstate pipe lines and distributing companies both have the characteristics of public utilities by nature and are regulated as such.

These two branches of the natural gas industry are granted franchises which authorize use of property to the exclusion of all others, and limits competition. As public utilities they enjoy another legal advantage—the right of eminent domain. By court order they can lay their lines across your property regardless of your views in the matter.

While their rates or charges for gas are regulated in exchange for the franchises they enjoy, the interstate pipe lines and city distributors are permitted to charge rates that are sufficient to provide a reasonable profit on their investment. Their risks, therefore, are greatly





reduced by elimination of competition and by assured profit. For example, the Federal Power Commission fixes the rates of interstate pipe lines so they will not exceed slightly over a 6 percent annual rate of return.

Producers Are Not Public Utilities

Here are the reasons . . .

1. The natural gas producer is given no exclusive area in which to develop natural gas supplies. He competes vigorously with all other producers seeking to find reserves.

2. He is not assured a geographically exclusive market for his output.

3. He is afforded no public license of a balance of supply and demand at a price that will afford him a fair return on investment.

4. There is no consistent relationship between capital investment and amount of production. The risk element of the oil and gas producing industry is well known to be exceptionally hazardous. Some make substantial capital outlays with little or no discovery. Others, with comparatively little expenditure, are fortunate enough to find sizable quantities.

Producers Are Highly Competitive

One of the major tests of a public utility is the amount of competition an industry, company or group of companies has. If there is little or no competition, federal regulation is adopted to protect the consumer.

No group is any more competitive than natural gas producers. The FPC estimates there are more than 5000 different operators producing gas in the United States.

Considering lease partnerships and those not selling in interstate markets, reliable sources place the total number of producers at 8000.

From an economic standpoint, the relative size of producers is more important than their number. The concentration of natural gas output is low compared with most large industries. The largest firm owns less than 10 percent of the domestic natural gas reserves. The four largest firms supply 17 percent of the *output,* the eight largest supply 28 percent, the 20 largest supply 46 percent, and the 50 largest supply 66 percent, and the remaining 34 percent is supplied by thousands of small producers. (See chart on page 4).

The concentration of national output is much higher in other mining industries, except for bituminous coal. In the Texas market, which is the largest and most important, the four largest producers supply about 21 percent of the output, the eight largest supply about 33 percent, and the

20 largest supply about 50 percent.

Natural gas producers are certainly not public utilities because of any lack of competition.

Competition Has Kept Prices Low

It is puzzling to understand why some groups are so anxious to see producer prices regulated. Producers receive only a small part of the consumers' total gas bill. Because of transportation and delivery expenses, consumer prices range from 70 cents per thousand cubic feet in gas producing areas to more than $2.00 per thousand cubic feet in areas far from producing fields. The average U. S. gas bill is about 89 cents per thousand cubic feet.

Only 10 to 15 percent of your total gas bill represents the cost of gas at the point of production.

Natural Gas Is the Cheapest. Official government indexes of wholesale and retail prices show a smaller relative increase for gas than for other fuels since 1945. During the past 10 years, the index of gas prices has increased at most about 20 percent, compared with gains of 50 to 80 percent for other fuels.

As of 1956, one million British thermal units (Btu) of energy sold at the point of production for an average of 10.1 cents in the case of natural gas, 18 cents for bituminous coal, 33 cents for anthracite coal. Even on new contracts, the average price for gas is less than for coal.

In the period from the passage of the Natural Gas Act in 1938 until 1954, during which there was no federal control of the field price of gas, the cost per million Btu's of heat content increased about 5 cents for natural gas compared with 12 cents for bituminous coal, 24 cents for anthracite coal, and about 30 cents for crude oil.

In short, the U. S. consumer pays less for the nation's cleanest, most efficient fuel than he would pay for coal or oil. However, this won't be true for long if producers lose their incentive to find and develop new reserves.

Needed: Legislation to Free Producers

There is no doubt that the federal price regulation imposed on natural gas producers would be disastrous to the industry, the consumer and the nation.

There is only one way to solve the problem: Corrective legislation.

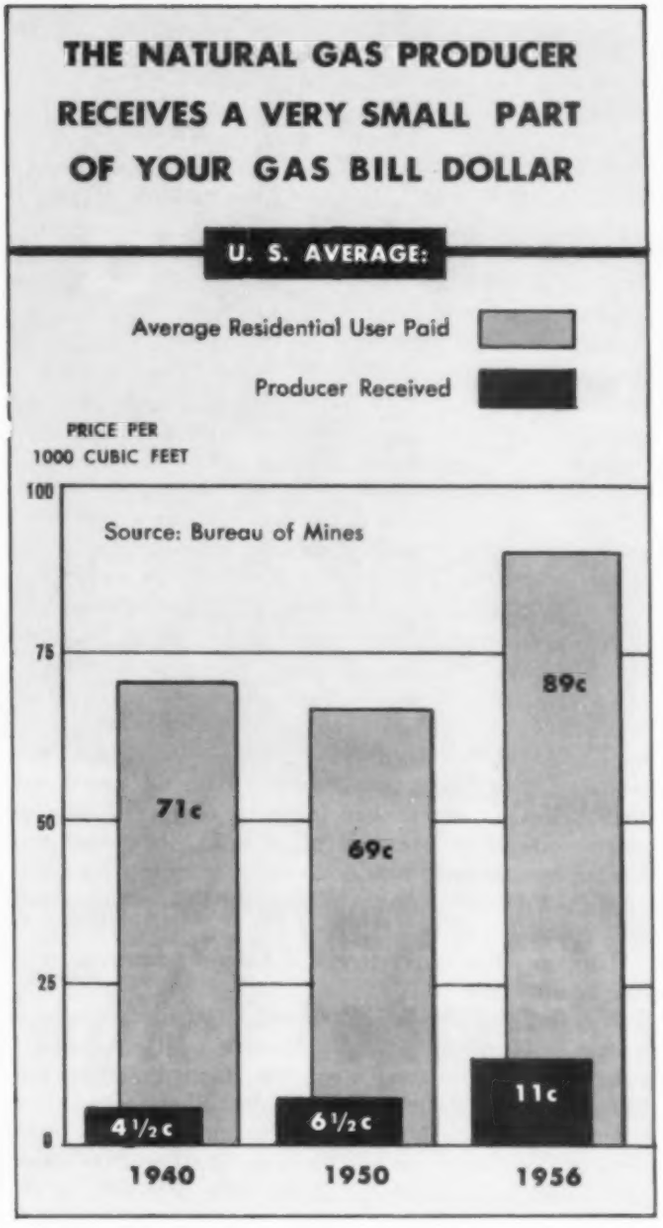
It has been clearly established that workable competition exists among producers of natural gas and is effective in determining fair prices at the point of production. Although prices of natural gas in the field have increased as a result of the economic forces affecting the market for fuels during the past 10 years, producer prices of other commodities have risen also—many much higher than natural gas (See chart, page 6).

Under these circumstances, competitively determined market prices should prevail for the good of our national economy. Any other level of prices, including federal control, will be artificial, and will create difficult problems of shortage that can easily be avoided.

The proper solution of the important natural gas problem is to rely on competitive market prices and to enact legislation designed to allow such market prices to prevail without regulation by government.

Although the Harris-O'Hara Bill will still allow federal control of market prices, it is the lesser of the two evils facing natural gas producers. The other evil is cost-plus control.

You can help the producers by giving active support to such legislation. By letting your senator and congressman know how you feel. To better equip you for such action, here is a brief review of the legislative activity that has transpired to date . . .



Case of Contradicting Interpretations

Congress in 1938 emphatically stated there was to be no federal control over natural gas producers. That year, our nation's legislators passed the Natural Gas Act which gave the FPC regulatory authority over transportation of natural gas in interstate commerce and over sales of gas in interstate commerce for resale.

But, Section 1 (b), the jurisdictional section of the Act, specifically says: "The provisions of this Act . . . shall not apply . . . to the production or gathering of natural gas." This section together with the legislative history of the

Act, evidences the intent of Congress not to regulate independent producers and gatherers.

In 1950, Congress passed the Kerr bill to establish once and for all that production was exempt from the Natural Gas Act. President Truman vetoed the bill.

The FPC itself ruled on 11 separate occasions between 1938 and 1951 that it had no jurisdiction over sales of natural gas by independent producers and gatherers. The last decision of the Federal Power Commission was in the ill-fated Phillips case in 1951.

The "Ides of March". The Phillips Ruling was appealed and ultimately reversed by a 5-to-3 split decision of the Supreme Court of the United States. The date of that decision, June 7, 1954, was the "Ides of March" for natural gas producers. The Supreme Court had ruled that wholesale sales of natural gas destined for resale in interstate commerce are subject to federal control.

Justice Clark had this to say about the interpretation: "It leaves a mass of empty pipe, vacant processing plants and thousands of hollow wells with scarecrow derricks as monuments to this new extension of Federal Power."

The FPC Stepped In. Immediately after the Supreme Court decision, the Federal Power Commission issued an order, since twice amended, which laced the nation's natural gas producers in a strait jacket. Producers were ordered to file for certificates on all contracts involving sale to a pipe line engaged in interstate transportation; their prices, in effect, were frozen as of June 7; and no matter how their contracts might read, they were prohibited from making new deliveries to interstate pipe lines or discontinuing old ones without prior FPC approval and certification.

This, in more direct terms, is federal hamstringing of free competition.

Try, Try Again. In 1956 another attempt was made to free natural gas producers from federal control as a public utility. This time it was the Harris-Fulbright Bill. Congress passed the measure. President Eisenhower vetoed it for reasons based on extraneous circumstances apart from the merits of the bill. Even so, the President stated that legislation conforming to the basic objectives of the bill is needed because the existing type of regulation "will discourage individual initiative and incentive to explore for and develop new sources of gas."

A New Effort Is Being Made

In his last budget message, President Eisenhower called for legislation that will insure gas consumer protection, incentives for supply development, fair and competitive producer prices, ending of utility-type controls, plus encouragement of sales to interstate markets to the benefit of consumers, producers and the national interest.

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The bill was cleared by the House Rules Committee last July and is now ready for vote in the Senate and House of Representatives when the next session of Congress convenes in January. It is generally conceded that at last legislation has been prepared which will answer most, if not all, the objections raised against the previous measures.

The Budget Bureau says the Harris-O'Hara Bill "largely fulfills" the President's recommendations and that it agrees with five "consumer protection" amendments sought by the FPC. In turn, the FPC has endorsed it as "sound in principle".

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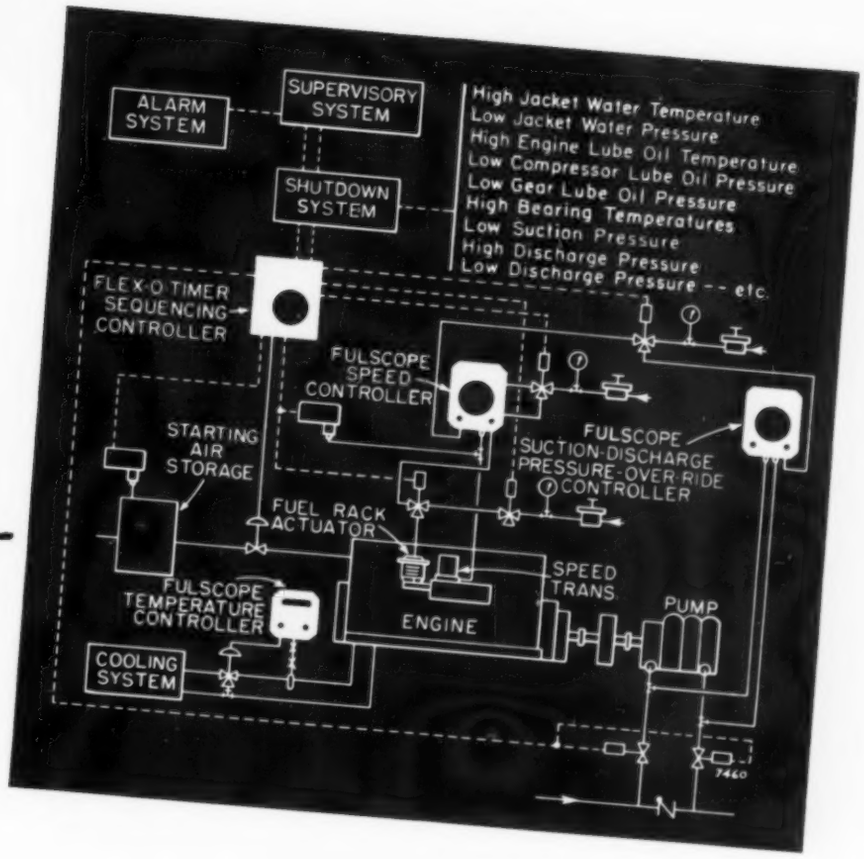

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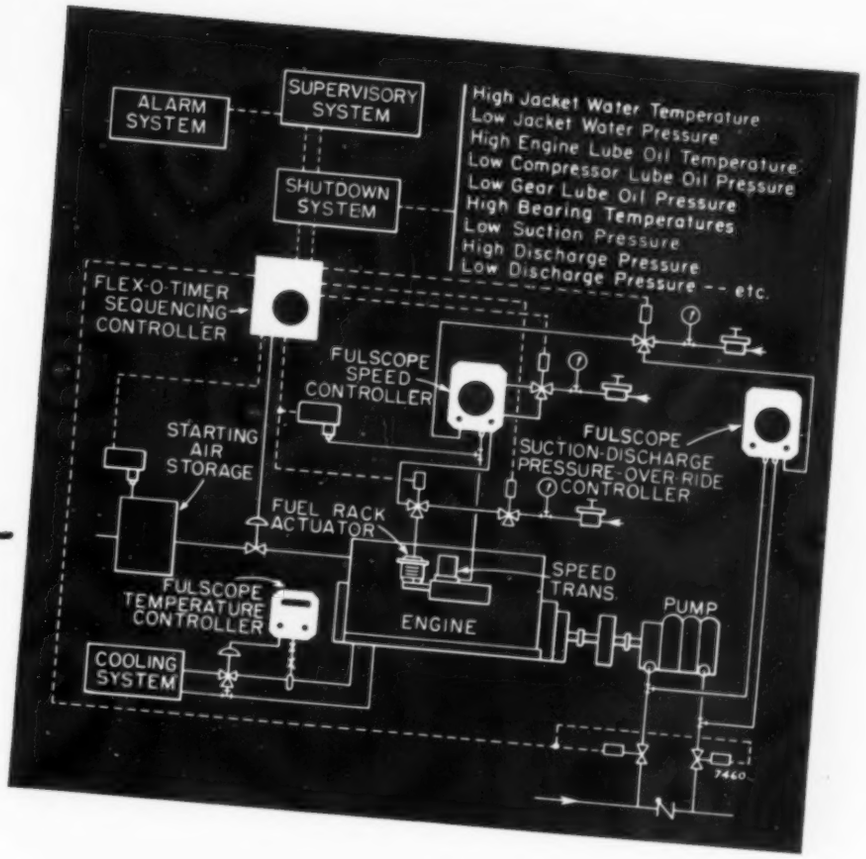

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Eleven advantages are included in the design and operation of this new model:

1. Positive action—line pressure is utilized for opening and closing.
2. Dependable. Opening pressure is pre-set by application of dead weight or spring load.
3. Instantaneous opening to full capacity.
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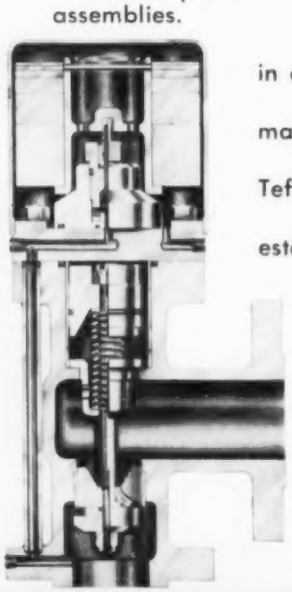
5. No chatter or wire-drawing at seat.
6. Functional Testing. Hand lifting of pilot stem operates valve at **any** pressure.
7. Simple and rugged. Valve contains only two moving assemblies.



8. High capacity. Ample flow area provided in all sizes.
9. Positive Seating. Line pressure utilized to maintain valve shut.
10. Corrosion resistant. Full stainless trim with Teflon disk.
11. No pressure accumulation needed. Full lift established immediately.

Model 412 Valve sizes are 2", 3", 4", 6" and 8" with working pressures up to 1000 p.s.i.; pilots are available in four ratios: 5:1, 10:1, 25:1, and 50:1. For complete details on this and other Kinzbach pressure relief valves, write for new catalog.

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Northern, but also items about the 36 utility companies served.

Dealings With the Press. Being a wholesaler, Northern maintains a rather conservative program of press releases. Some 400 to 500 releases are issued annually. However, this figure in many instances represents duplication of the same release going to more than one newspaper, radio station, TV station or press service. Since the releases are not issued with too great a frequency, they obtain almost 100 percent usage.

In addition to the regular news outlets, a good majority of news releases go to the trade journals. More than 50 percent of the releases are accompanied by photographs. Also, a special press kit is ready to go at all times. The kit includes copy and a set of photos describing the operations of bringing gas from the field into the market area.

Other Communications Channels. Northern's annual report, though primarily designed for stockholders, is sent to a large number of financial analysts and other business executives throughout the country. It is also channeled to many of the same news media that press releases are sent to.

To date, Northern has produced six company movies. Four of these have been movies on various company operations and two have been public service films. The movies are shown to more than 50,000 people per year, in addition to numerous TV showings.

Another communications benefit for Northern employes is the company reading rack which contains each week some 600 copies of a new pamphlet. These pamphlets usually include articles and items of general interest with subject matter ranging from meal planning, vacation planning and barbecue cooking to the economics of American business. Occasionally a booklet pertaining to the natural gas industry or perhaps some material specifically about Northern will be sprinkled in with the regular diet of general information pamphlets.

In addition to the regular communications channels, Northern prepares special brochures whenever the occasion warrants. These average three or four per year. A typical one would be the special brochure which was published in connection with Northern's 25th year of operation in Minnesota which was given wide distribution. —The End

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Dependable Accuracy Under All Conditions—1/16 inch accuracy at depths of zero to 64 feet. No need to recalibrate over a wide range of liquids, temperatures and specific gravities. DATA-GAGE is the *only* system to give reliable readings during blending turbulence.

Low Initial and Long-range Cost—DATA-GAGE is a complete measurement system requiring no expensive extras. No special transmission system or conduits are required at installation—often existing ground level gauge connections and pipes can be utilized. Transistors are used instead of short-lived vacuum tubes. Easy access and quick-disconnect parts in all units make this the easiest to service of all systems.

Operational Simplicity—operator simply dials tank number and awaits data to be displayed seconds later on the exclusive DataFLASH reading panel. He need not make comparative readings to determine errors—DATA-GAGE automatically checks itself.

Power Float Reliability—the mechanical surface finder is a moving rather than static float, registers the instant surface tension is broken. No possibility of tilting, locking or sticking and giving an erroneous reading.

Proved Telemetering—true digital system employs digital code in binary decimal form. Means of transmission is a completely redundant (code group and its complement are transmitted), three-state code, the reliability of which has been thoroughly proved in transatlantic telegraphy.

Utmost Safety Precautions—field units are plug-in type which may be removed to safe area for servicing. No electric wires enter the tank. Explosion-proof housings are available on all field units.

For complete detailed information on the modern DATA-GAGE system, write for Bulletin No. M-601.

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Engineering Design —37—Length of Pipe in Arc Subtended by Any Angle

DEGREES						MINUTES			
Degrees	Length Of Arc	Degrees	Length Of Arc	Degrees	Length Of Arc	Minutes	Length Of Arc	Minutes	Length Of Arc
1	.0175	31	.5411	61	1.0647	1	.000291	31	.009018
2	.0349	32	.5585	62	1.0821	2	.000582	32	.009308
3	.0524	33	.5760	63	1.0996	3	.000873	33	.009599
4	.0698	34	.5934	64	1.1170	4	.001164	34	.009890
5	.0873	35	.6109	65	1.1345	5	.001454	35	.010181
6	.1047	36	.6283	66	1.1519	6	.001745	36	.010472
7	.1222	37	.6458	67	1.1694	7	.002036	37	.010763
8	.1396	38	.6632	68	1.1868	8	.002327	38	.011054
9	.1571	39	.6807	69	1.2043	9	.002618	39	.011345
10	.1745	40	.6981	70	1.2217	10	.002909	40	.011636
11	.1920	41	.7156	71	1.2392	11	.003200	41	.011926
12	.2094	42	.7330	72	1.2566	12	.003491	42	.012217
13	.2269	43	.7505	73	1.2741	13	.003782	43	.012508
14	.2443	44	.7679	74	1.2915	14	.004072	44	.012799
15	.2618	45	.7854	75	1.3090	15	.004363	45	.013090
16	.2793	46	.8029	76	1.3265	16	.004654	46	.013381
17	.2967	47	.8203	77	1.3439	17	.004945	47	.013672
18	.3142	48	.8378	78	1.3614	18	.005236	48	.013963
19	.3316	49	.8552	79	1.3788	19	.005527	49	.014254
20	.3491	50	.8727	80	1.3963	20	.005818	50	.014544
21	.3665	51	.8901	81	1.4137	21	.006109	51	.014835
22	.3840	52	.9076	82	1.4312	22	.006400	52	.015126
23	.4014	53	.9250	83	1.4486	23	.006690	53	.015417
24	.4189	54	.9425	84	1.4661	24	.006981	54	.015708
25	.4363	55	.9599	85	1.4835	25	.007272	55	.015999
26	.4538	56	.9774	86	1.5010	26	.007563	56	.016290
27	.4712	57	.9948	87	1.5184	27	.007854	57	.016581
28	.4887	58	1.0123	88	1.5359	28	.008145	58	.016872
29	.5061	59	1.0297	89	1.5533	29	.008436	59	.017162
30	.5236	60	1.0472	90	1.5708	30	.008727	60	.017453

Application:

To find the length of pipe subtended by an angle of 42°-35 feet with a radius of 24 inches.

Assuming R = 1 inch,

angle of 42° subtends an arc = 0.7330″

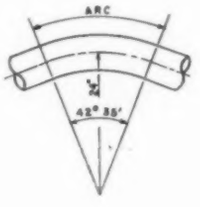
angle of 35′ subtends an arc = 0.01018″

0.7432″

But the arc subtended for any angle is directly proportional to radius:

$$\frac{1 \text{ inch}}{24 \text{ inches}} = \frac{0.7432 \text{ inches}}{\text{Arc}}$$

$$\text{Arc} = 0.7432 \times 24 = 17^{13}/_{16}\text{″}$$

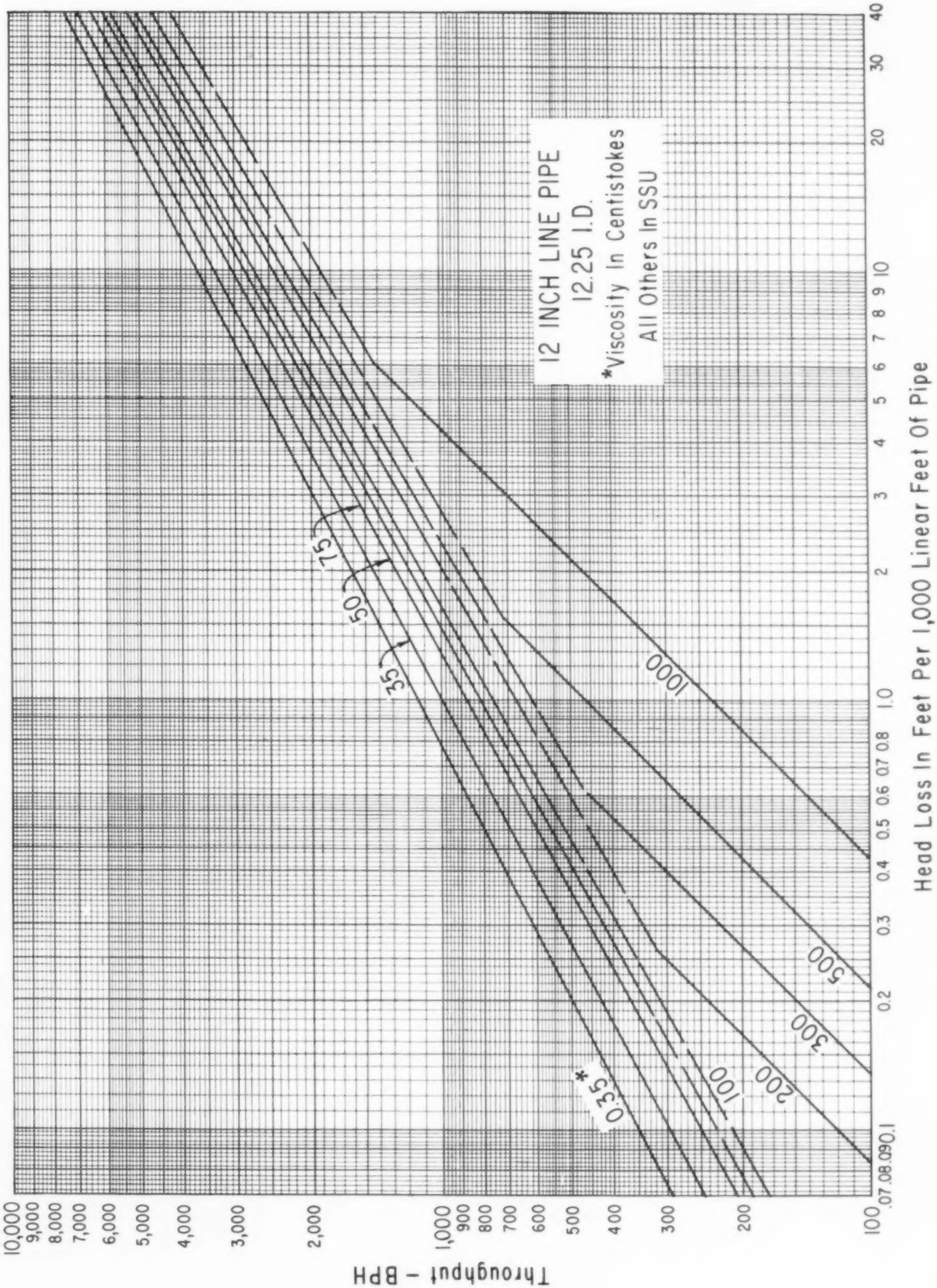


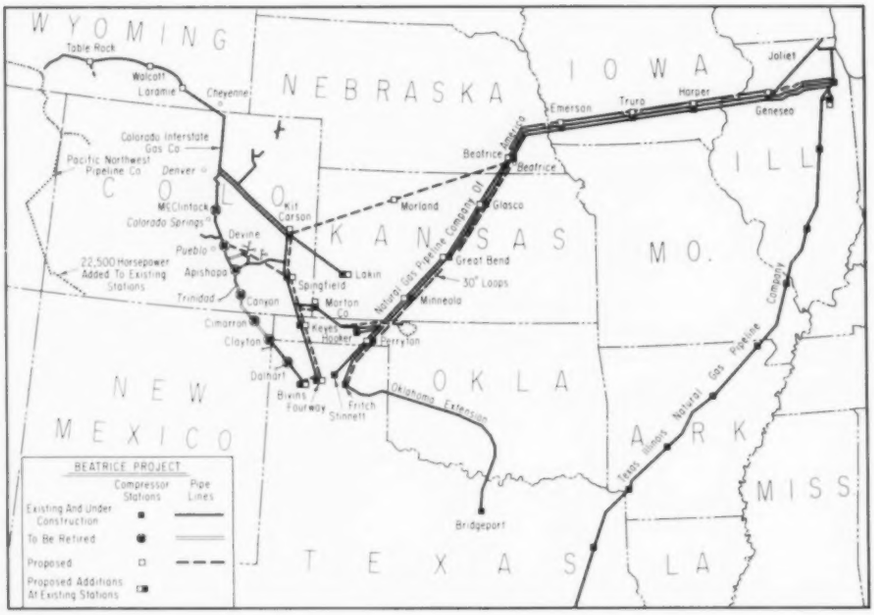
Engineering Design —38—Head Loss Charts for Various Sizes of Pipe

Friction Loss Characteristics for 12-inch pipe were computed by a pipe line company using data of the Hydraulic Institute. Use of this data in laminar and critical zones is adequate for estimates. Friction losses in transition and complete turbulent zones are very accurate.

(Chart 5 in a series of 19—12-inch line pipe)

ENGINEERING DESIGN 38





5 Companies Get FPC Examiner's Okay For $182 Million Interdependent Plan

Five pipe line companies have been authorizd by a Federal Power Commission examiner to construct facilities having a combined cost of nearly $182 million. The decision granted certificates to Natural Gas Pipeline Company of America, Texas Illinois Natural Gas Pipeline Company, Chicago District Pipeline Company, Pacific Northwest Pipeline Corporation and Colorado Interstate Gas Company.

The applications of the five companies are interdependent, forming primarily a unified proposal to make additional 485 Mmcf of natural gas per day available to market areas in the Midwest, particularly in the Chicago area.

The examiner's decision is subject to review by the commission.

Natural Gas Pipe Line's project, estimated to cost $76,199,000, includes the construction of 415.7 miles of 36-inch loop line between Beatrice, Neb., and Joliet, Ill., to increase its system capacity by 450 Mmcf daily. The project also includes the supercharging of 86 mainline compressor engines at its station numbers 102 to 110 in Oklahoma, Kansas, Nebraska, Iowa and Illinois. This portion of the project, for which the company received temporary authorization last April, is designed to add 35 Mmcf per day of additional sales capacity.

The decision authorizes Texas Illinois to abandon its sales, which in the future will be made by Natural, and to construct two metering and regulating stations at an estimated cost of $61,600.

Chicago District proposes to build facilities to increase its system capacity by 456 Mmcf of gas per day. The project includes construction of approximately 52 miles of 36 and 30-inch loop lines between Joliet and Chicago. Estimated cost of the project is $13 million.

Colorado Interstate will build a total of more than 700 miles of pipe line and install 60,980 horsepower in new and existing compressor stations at an estimated cost of approximately $86,934,900. The proposed pipe lines, between Fourway, Texas, and Kit Carson, Colo., include 109 miles of 26-inch loop, 40.3 miles of 34-inch loop, 66 miles of 30-inch loop, and 345 miles of 30-inch loop. Other lines will affect 50 miles of 22-inch supply lateral off Hooker line in Oklahoma panhandle, 100 miles of 24-inch between Devine, Colo. compressor station and Springfield, Colo. compressor station, 12 miles of 24-inch crossover connections between the Fourway compressor station and Bivins in the Texas panhandle, ten miles of supply lateral from Table Rock Field in Wyoming, and 24 miles of supply lateral from Greenwood Field in Southwestern Kansas to the Fourway-Kit Carson line.

Colorado Interstate's additions at newly proposed compressor stations are 8000 hp at Table Rock, Wyo., 8000 hp at Walcott, Wyo., 6000 hp at Laramie, Wyo., and 10,000 hp at Moreland, Kansas. Horsepower additions to existing compressor stations include 1400 hp at Lakin, Kansas, 1320 hp at Kit Carson, Colo, 3000 hp at Springfield, Colo., 10,420 hp at Morton County, Kansas, 10,000 hp at Fourway, Texas, 1640 hp at Bivins, Texas, and 1200 hp at Keyes Station, Okla.

The horsepower totals to be retired at Colorado Interstate compressor stations at McClintock, Devine, Apishapa and Canyon, Colo. are 3200, 4050, 665 and 5200 hp, respectively. Other retiring compressors will be 4600 hp at Cimarron, N. M., 4600 hp at Clayton, N. M., and 4800 hp at Dalhart, Texas. Colorado Interstate is also retiring 86.9 miles of 22-inch main line in Colorado and New Mexico and other supply crossovers in Colorado.

The project will enable Colorado Interstate better to serve its existing customers in the Rocky Mountain area and to deliver a maximum of 460 Mmcf of natural gas per day to Natural at Beatrice, Neb. When the new deliveries to Natural are started, Colorado Interstate will discontinue its present deliveries of 50 Mmcf per day to Natural at another point. Presiding examiner Law conditioned the authorization to require the company to submit a feasible financing plan prior to the beginning of construction by Colorado Interstate, Natural, or Chicago District. Colorado Interstate also must submit to the FPC a satisfactory rate schedule for the sale of gas to Natural prior to

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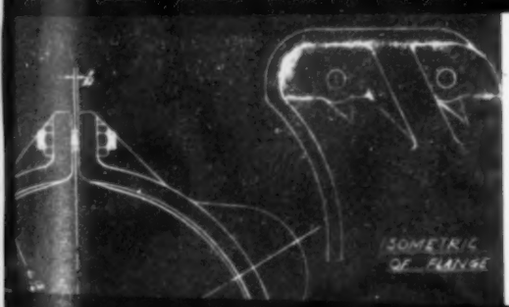

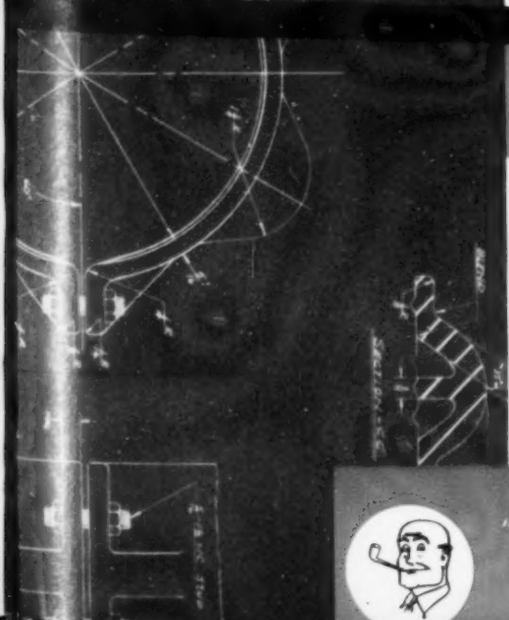

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commencing operation of the new facilities.

Pacific Northwest will construct facilities, estimated to cost $5,757,750 to enable it to sell 117,500,000 cubic feet daily which Pacific Northwest now sells to Colorado Interstate. Pacific Northwest's project includes installation of 22,500 hp in existing compressor stations. The certificate is conditioned to require Pacific Northwest to obtain FPC approval of a more definite proposed plan of financing prior to commencing construction of its additional compressor facilities and to submit to the Commission a cost of service study in support of rates proposed to be charged to Colorado Interstate prior to starting deliveries.

The decision approves a plan whereby Natural will become the sole seller to customers of itself and Texas Illinois. Natural will purchase all gas delivered by Texas Illinois and make its present system and the proposed additional capacity available to Texas Illinois' customers as well as to its own present customers. The examiner conditioned this authorization to require that Natural charge the same rates that Texas Illinois has been charging, pending FPC approval of any rate changes.

A part of Natural's application, involving the proposed sale of 115 Mmcf of natural gas to two of its customers for resale to the United States Steel Corporation and the Inland Steel Company for use in steel plants in Chicago, Ill., and East Chicago and Gary, Ind., previously had been severed from this proceeding and consolidated for hearings with a competing application by Midwestern Gas Transmission Company of Houston. Midwestern proposes, among other things, the sale of natural gas to these same steel plants. The decision is conditioned to require that Natural must obtain from one or more of its principal customers firm and definite commitments to purchase this 115 Mmcf on a temporary basis prior to commencing construction of its proposed new facilities.

By presiding examiner Glen R. Law, the decision authorizes Pacific Northwest to sell natural gas to Colorado Interstate, which in turn will make sales to Natural Gas Pipe Line Company. Natural, Texas Illinois, and Chicago District, all affiliates in the Peoples Gas Light and Coke Company system, are operated as a single integrated system primarily supplying gas for ultimate consumption in Chicago and adjacent areas of northern Illinois and Indiana.

New Company Proposes Mexico-Cuba Gas Line

A pipe line proposal to bring low cost natural gas to areas in Cuba and Florida is the aim of Cuban Gas Transmission Co., a recently organized firm hoping to carry out Edwin W. Pauley's plan to build an underwater natural-gas line from southeastern Mexico to Cuba.

To be 650 miles in length, the line would include 150 miles of submarine pipe line from the Campeche natural gas fields in Mexico to run along the floor of the Gulf of Mexico from the Yucatan Peninsula to Cuba, then 150 miles through Cuba to Havana and again undersea to Florida. Some of the proposed submarine pipe lines in the Gulf of Mexico would traverse waters of more than one mile deep.

Pauley, a Los Angeles independent operator, is active in Mexican oil and gas ventures for Petroleos Mexicanos. The new Cuban company has initial capital of $5 million.

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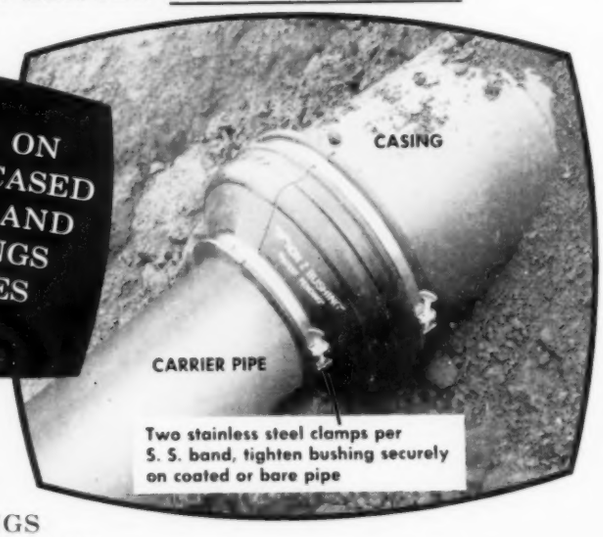
WmSEAL SPLICED "Z" BUSHINGS* for PIPELINES IN OPERATION

*INSTALLED ON EXISTING CASED CROSSINGS AND SPLIT CASINGS ON PIPELINES IN SERVICE



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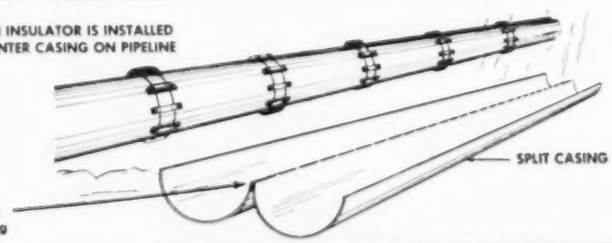
EVERY OTHER WmSON INSULATOR IS INSTALLED UP-SIDE-DOWN TO CENTER CASING ON PIPELINE



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Texas Eastern Charges Anti-Trust Violation in $32 Million Civil Suit

Texas Eastern Transmission Corporation filed a $32,235,000 civil damage suit against nine barge operating companies, three oil companies and one individual alleging violations of the Sherman and Clayton Anti-trust Acts.

The Shreveport-based company filed the suit in the U. S. District Court of the Eastern district of Louisiana in New Orleans October 7.

Listed as defendants in the complaint are the following oil companies: Ashland Oil & Refining Co., Ingram Co., Inc., Martin Oil Co., and the following barge operators: the Comet River Co., Chotin Towing Corp., F. W. Gladders Towing Co., Inc., Greenville Towing Co., Inc., Walter G. Houghland Sons, Inc., Industrial Marine Service, Inc., Ingram Barge Co., Lea River Lines, Inc., Rover Co., Inc., and Harry Baker Jordan of New Orleans.

The complaint states that since 1952 the defendants continuously "have unlawfully combined, conspired and agreed to unreasonably restrict and completely eliminate competition with the defendant barge operators by any petroleum products pipe line in the interstate transportation of clean petroleum products from the Texas-Louisiana-Arkansas refinery area to the Midwest."

Texas Eastern contends that the defendants conspired to monopolize transportation of clean petroleum products from the Texas-Louisiana-Arkansas refinery area to the midwest. It charged that the defendants appointed Harry Baker Jordan, also named as a defendant, to take charge of and conduct a campaign for the purpose of "harassing, obstructing, delaying and preventing any and all pipe line companies from constructing or operating a clean petroleum products common carrier pipe line from the Texas-Louisiana-Arkansas area to the Midwest."

Texas Eastern said the unlawful campaign carried out by the defendants has delayed completion of the conversion of the Little Big Inch pipe line to a common carrier of petroleum products, resulting in damages of $10,745,000 to Texas Eastern. Under the law the plaintiff is permitted to recovery of triple damages.

The complaint also asked the defendants "be enjoined from further attempts to carry out the unlawful purposes of the aforementioned combination and conspiracy."

Transco Plans Gas Line Offshore from Louisiana

Transcontinental Pipe Line Corporation recently disclosed plans to extend a projected 24-inch pipe line into the heart of the major offshore gas reserves region of South Louisiana.

The extension would be part of a new financing and construction program that Transco announced at a board of directors meeting in October. New financing would be achieved through offerings of $20 million in

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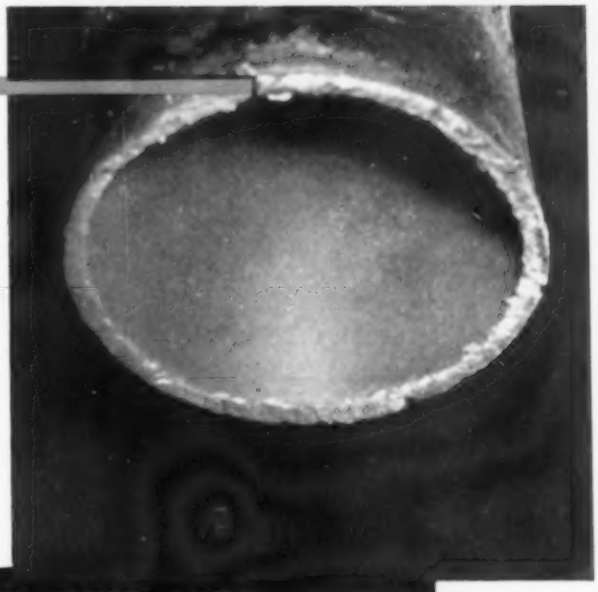

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This smooth interior surface means improved "C" factor, restored throughput.

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Kontol-protected pipe eliminates the need for higher pump pressures to maintain throughput, requires fewer scrapings and avoids corrosion contamination of your products. Kontol 77 meets military specifications for use in jet fuels and automotive gasolines.

SEE WHAT KONTOL 77 DID FOR THIS PIPE LINE

	Date	"C" Factor	Use of Pigs
BEFORE KONTOL 77	May	125	4 knife scrapers, 1 brush scraper
	June	125	10 knife scrapers, 1 brush scraper
	July	127	6 knife scrapers
	August	130	20 knife scrapers
	September	132	26 knife scrapers
	October	138	18 knife scrapers
	December	141	14 knife scrapers
KONTOL 77 WAS USED HERE!	February	141	6 knife scrapers
	February (following year)	141	NO SCRAPERS FOR ENTIRE YEAR!

See your Kontol Service Engineer soon!

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debentures, due 1978, and 1 million shares of common stock. Net proceeds would be used for construction and to repay outstanding bank loans.

Last August Transco requested Federal Power Commission authorization to build a 65-mile lateral pipe line into Lafourche and Saint Charles parishes, Louisiana, at a cost in excess of $14 million. The line would tap gas reserves in seven fields.

A Transco statement said the company estimates it will spend approximately $60 million in completing construction work scheduled as of August 31. In addition it said Transco plans to file with the FPC an application to construct facilities for further expansion of the system at an estimated cost of $139 million.

The new construction program, in conjunction with other companies, would include new storage facilities in a Pennsylvania area near Transco's market on the Eastern seaboard.

Continental Buys Part Of Butte Pipe Line Firm

Continental Oil Company recently purchased a 12½ percent interest in the Butte Pipe Line Company which operates a 510-mile crude line extending from the East Poplar field in northeastern Montana to Fort Laramie and Guernsey, Wyo.

The 12½ percent interest purchased by Conoco was formerly owned by Placid Oil Company of Shreveport, La. Other interest holders of the 16-inch line are Shell Oil Company with 60 percent, Murphy Corporation with 17½ percent, and Northern Pacific Railway Company with 10 percent. Shell operates the Butte line for the group.

Shell Plans 100-Mile Line For Louisiana Delta Area

Shell Pipe Line Corporation has announced construction plans for a crude oil pipe line in the delta area of southern Louisiana to originate at the company's southwest pass terminal and terminate at the company's Norco Refinery, 18 miles west of New Orleans.

To be a common carrier, the trunk line will probably be of 16 or 20-inch diameter and about 100 miles long. Exact size, length, capacity and cost of the line cannot be determined at present until the additional company participants are known, reported President Joe T. Dickerson.

Crude oil from fields in the Delta region is currently being moved by barge to refining areas.

Pipe Line System Planned For 3 European Countries

European reports divulge plans by East Germany, Poland and Czechoslovakia to construct a pipe line system to serve the three Communist states and connect with Danube River tanker traffic.

The pipe line would extend from Stettin, the big Polish port on the Baltic, along the Oder River into Czechoslovakia. Branch lines would connect East German refineries and those in Poland and Czechoslovakia. The pipe line's southern terminus would be on the Danube.

Plans call for Danube tanker barges to move crude oil from Russia's Black Sea fields, from the Ploesti fields in Rumania, and from Austrian fields to refineries in the three countries. Refined petroleum products would be fed by the pipe line to Stettin for export loading.

Austria, by terms of the independence agreement with Russia, is pledged to deliver 1,000,000 tons of crude oil to Russia annually in settle-

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Years of engineering mastery, manufacturing experience and tough field testing have proved the unequaled quality of Tulsa Power Take-Offs. Precision-made . . . compact . . . powerful, durable and quiet . . . Tulsa Power Take-Offs are foremost with these outstanding features . . . shaved and heat-treated gears, hardened shifter yokes; anti-friction bearings throughout; strong, lightweight heat-treated aluminum housings . . . extremely low prices with nationwide distribution and service. Tulsa assures you unequaled quality in Power Take-Offs sized from single speed, medium duty to multiple speed, heavy duty models.
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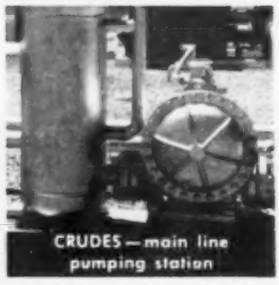
PRODUCTS—head of line station

CRUDES—to tank storage

PRODUCTS—dual counter installation

PRODUCTS—pipeline terminal

CRUDES—custody transfer


CRUDES—main line pumping station

PRODUCTS—terminal takeoff

CRUDES—to refinery from pipeline

CRUDES—incoming to main line station

CRUDES—main line station

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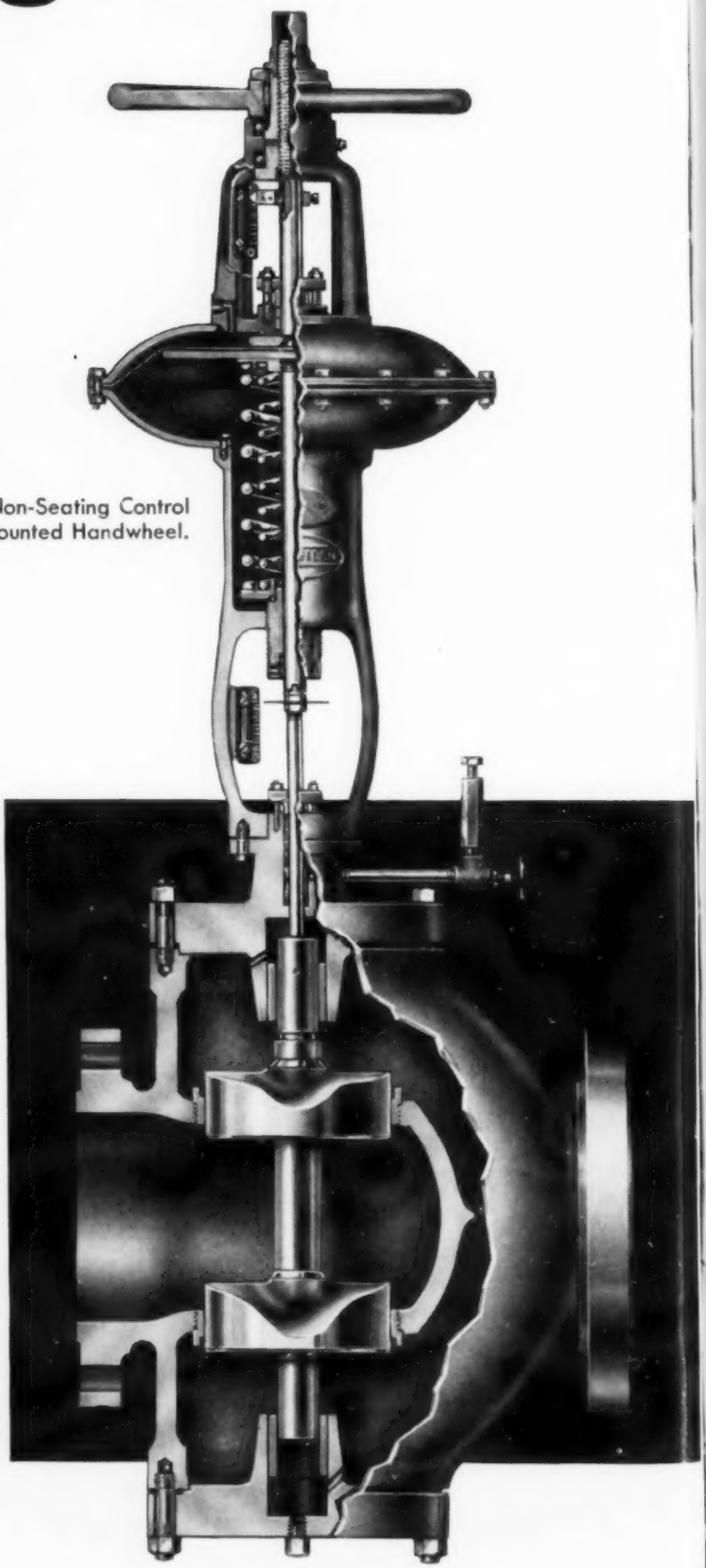
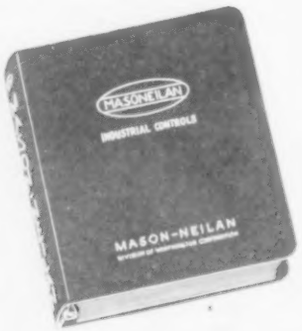


Masoneilan 16" Non-Seating Control Valve with Case Mounted Handwheel.

Many years of field experience, practical engineering plus skillful manufacture, make Masoneilan Control Valves the choice of the Pipe Line Industry. These control valves combine accurate performance, stamina, and economy insuring reliable operation and maximum return on investments.



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Mason-Neilan has specifically designed this non-seating control valve for use in petroleum and gas pipe lines. This Pipe Line Control Valve features:

- non-seating V-Port Plug having identical seat areas permitting ease of plug removal through blindhead or bonnet section of body.
- drain connection in blindhead, provides for periodic removal of sludge, sand, etc., from bottom guide hole.
- high C_v with minimum pressure drop in open position is combined with desirable flow characteristics.
- valve may be provided with Handwheel as shown. Available in sizes 12"-16"; with oversize outlet flange if desired.

Mason-Neilan

Division of Worthington Corporation

51 Nahatan Street, Norwood, Massachusetts

SEVENTY-FIFTH 75 ANNIVERSARY 1882-1957

Masoneilan 14" x 16" 600 lb. ASA 10000 Series Valve with a 330 sq. in. motor for pipe line service.

Masoneilan through bolted 138-3 valve on a crude oil pipe line.

ment of Soviet war claims on the Austrian oil industry.

The Soviets have been selling most of this Austrian oil to the satellites, mainly Czechoslovakia and East Germany.

On the other hand, the East bloc is short of refining capacity, most of which is concentrated in East Germany and Czechoslovakia.

The projected pipe line would be the Communist bloc counterpart to the Western European Sappeur pipe line project. Sappeur, or Trans-Europe, a joint undertaking of major European oil companies, would link West Germany, the Benelux countries, France and Switzerland.

Grapevine Products Post Finished by Continental

A $320,000 petroleum products terminal has been completed by Continental Oil Company located two miles southwest of Grapevine, Texas, on State Highway Number 121.

The terminal includes storage tanks with a total capacity of over 2 million gallons, tank truck loading facilities and a service shop. The new construction is located at the eastern end of Continental Pipe Line Company's six-inch products line from Wichita Falls, Texas.

Texas Eastern, Penn-Jersey Get FPC Nod For Gas Lines

Texas Eastern Transmission Corporation and Texas Eastern Penn-Jersey Transmission Corporation, both of Shreveport, La., have temporary authorization for the construction and operation of close to $30 million natural gas pipe line facilities.

Texas Eastern got incomplete authorization for construction of its 96 miles of 30-inch loop pipe line between Kosciusko, Miss., and Uniontown, Penn.

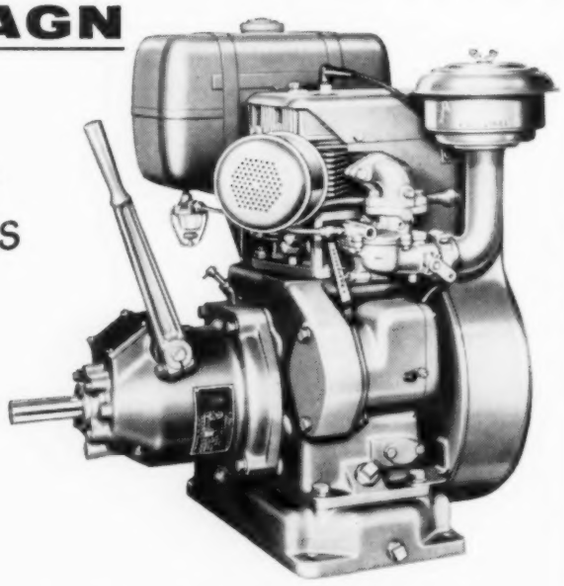
The FPC examiners decision also includes construction of about 9.4 miles of supply laterals, a new 10,250 hp compressor station, and the request for addition of 33,360 hp to existing compressor stations and related facilities. Cost of these facilities is estimated at approximately $24.5 million.

Penn-Jersey was authorized to add 24,000 compressor hp to existing stations on its pipe line system extending from Westmoreland County, Penn., to Texas Eastern's compressor station number 26 near Lambertville, N. J. These new additions will cost Penn-Jersey over $4 million.

Texas Eastern with its own additional facilities and those leased from Penn-Jersey, will be able to sell for resale an additional 128,217,000 mmcf of long-term firm gas per day to nine existing customers and to provide approximately 92,644,000 mmcf of winter peaking gas daily for the winter of 1957-58 to 19 present customers. After installation of the additional facilities, the estimated sales capacity of the entire interconnected Texas Eastern-Penn-Jersey systems will be more than 1 billion cubic feet per day.

Algonquin Gas Transmission Company of Boston, partially owned by Texas Eastern, was authorized to sell 6,260,000 cubic feet of winter peaking gas per day to nine existing customers. The gas will be purchased from Texas Eastern near Lambertville, N. J. No new facilities will be required by Algonquin to provide the additional service.

A NEW, BIG, 4-Cycle
Single Cylinder Air-Cooled Engine...
the WISCONSIN 12½ hp.
MODEL AGN
by Engine Specialists



Model AGN Engine with Clutch Assembly. Also available with stub shaft or with Reduction, Clutch Reduction and/or Electric Starting

• It takes full-time engine "know-how" and full-scale engine manufacturing *concentration* to design and produce engines of outstanding character *and* Performance Ability.

The new Wisconsin Model AGN 12½ hp. engine is the product of this unbeatable combination. *Engine specialists designed it. Engine specialists are building it.*

Putting 12½ hp. into a single cylinder air-cooled engine calls for basic *High Torque* . . . the *load-holding Lugging Power* that keeps the equipment *working* through sudden shock loads. It also calls for heavy-duty construction in all details . . . plus dependable cooling under all weather conditions from sub-zero to 140° F.

Bulletin S-216, just off the press, will give you details about Model AGN. Write for it.

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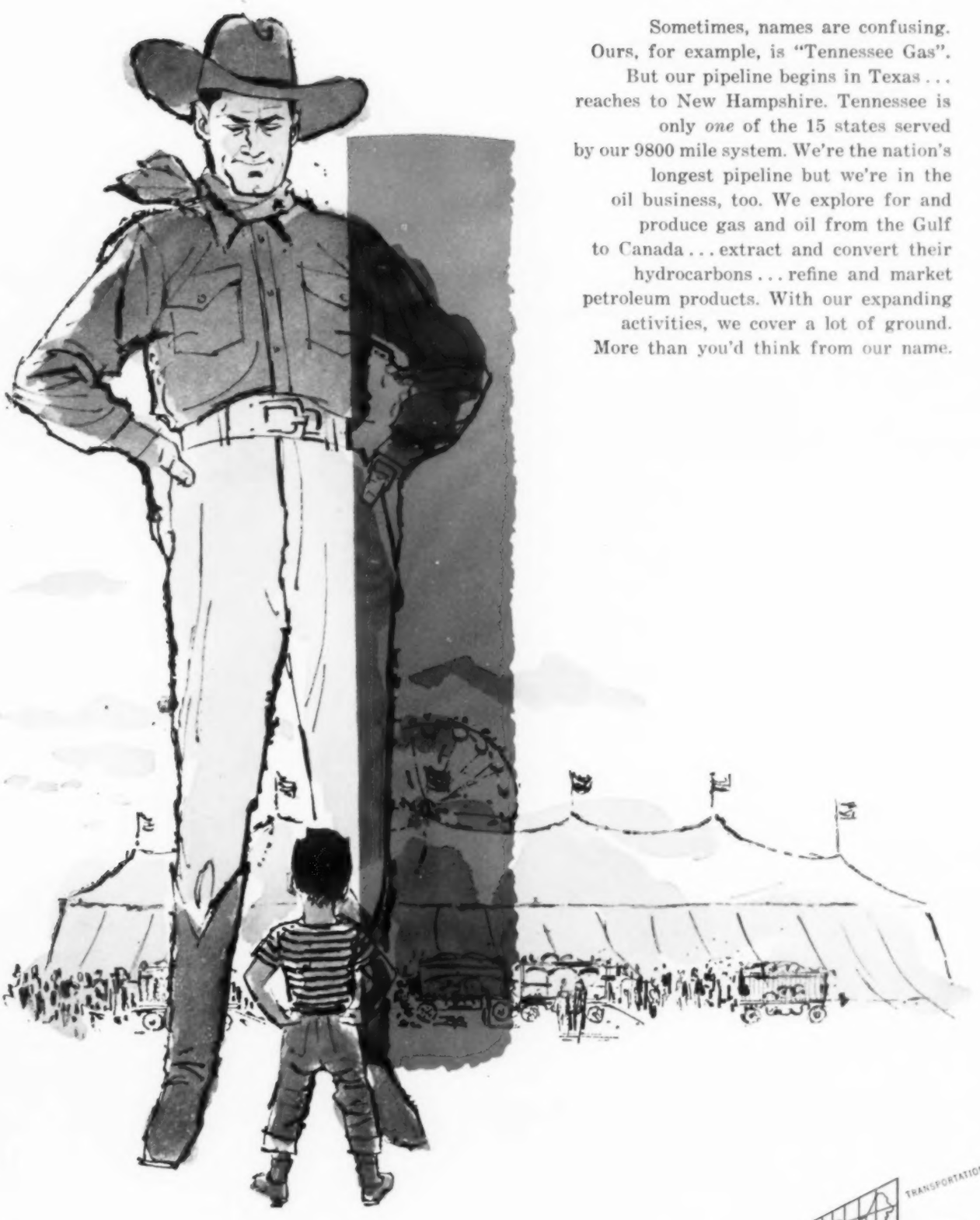
8 foot 5... and they call him "TINY"!

Sometimes, names are confusing. Ours, for example, is "Tennessee Gas". But our pipeline begins in Texas... reaches to New Hampshire. Tennessee is only *one* of the 15 states served by our 9800 mile system. We're the nation's longest pipeline but we're in the oil business, too. We explore for and produce gas and oil from the Gulf to Canada... extract and convert their hydrocarbons... refine and market petroleum products. With our expanding activities, we cover a lot of ground. More than you'd think from our name.



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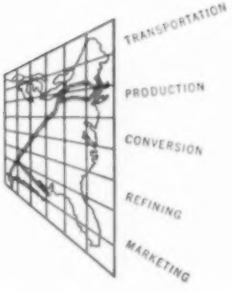
AMERICA'S LEADING TRANSPORTER OF NATURAL GAS

HOUSTON, TEXAS



For more data on advertised products, use Readers' Service Cards, last page.

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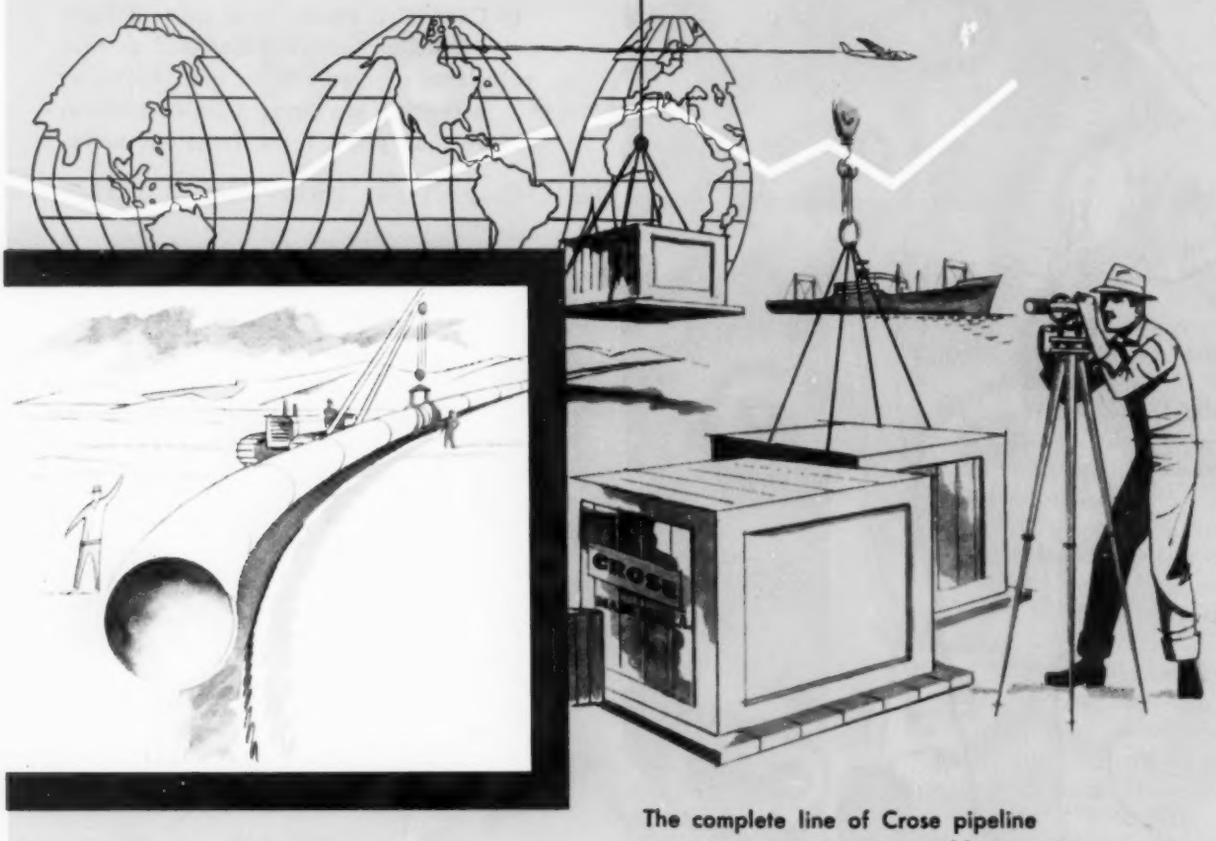

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Houston to New York Line Being Surveyed by Williams

A pipe line stretching 2500 miles from Houston to New York, which would be the longest liquefied petroleum gas carrier in the world, is being considered in a feasibility survey by Williams Brothers Company of Tulsa.

The pipe line has been proposed by the Katy and New York Central Railroads, on whose right-of-way the line would be laid a major part of the distance.

Decision on whether to build the 10 or 12-inch line will be made after Williams Brothers completes the survey in about two months.

Recently released statistics reveal that more than $615,966,000 worth of natural gas facilities were authorized by the Federal Power Commission during 12 months ended June 30, 1957.

PROPOSED PIPE LINE CONSTRUCTION

Here in convenient summary form is Pipe Line Industry's listing of company, line size, length, service, location and project status.

U. S.

Cape Pipe Line Co., Philadelphia, 100 miles, Delaware Bay to the Philadelphia refining area, planned.

Chicago District Pipeline Company, 52 miles, 30-36 inch, gas, from Natural Gas' proposed line at Joliet to Chicago, $13 million, temporary FPC authorization.

Cities Service Gas Co., Oklahoma City, 116 miles, gas, facilities in Kansas and Oklahoma and pipe lines in Kansas, $11.4 million, authorized.

41 miles, 30-inch from Verdigris River to the Petrolia compressor station; 33 miles, 30-inch between the Petrolia and Welda compressor stations; 4 miles, 4-inch in Wilson County, Kansas, and 6 miles, 12-inch gas line in Reno County, Kansas, plus replacement of facilities in Kansas, $6.5 million, temporary FPC authorization.

Clark Oil & Refining Corporation, 15 miles, from Clark refinery at Blue Island to Indiana Harbor area of Lake Michigan, and refining capacity additions, $7 million, planned.

Coastal States Gas Producing Co., Corpus Christi, Texas, 45-mile, gas gathering system in Bee County, Texas to connect with Texas Eastern's main pipe line, $1 million, planned.

Coastal Transmission Corp., Houston, 574 miles, 22-24 inch, gas, from McAllen, Texas to Baton Rouge, La. connection of Houston, Texas Gas and Oil plus 414 miles of laterals, $55 million, authorized.

Colorado Interstate Gas Co., Colorado Springs, 734 miles, 24-30 inch, gas, from Texas & Okla. Panhandle to Kit Carson, Colo., to Beatrice, Neb., plus four compressor stations, $87 million, temporary FPC authorization.

50 miles, 22 inch, gas, from Mocane area to existing system at Hooker, Okla., authorized.

Deep Rock Gas Co., Oklahoma City, 120 miles, 6-inch, LPG, from Tioga, N. D., to Canadian border, planned.

Eastern Shore Natural Gas Company, Salisbury, Md., 124 miles, 8⅝ and 6⅝-inch, transmission lines and facilities on eastern shore areas of Delaware and Maryland, $3 million, temporary FPC authorization.

El Paso Natural Gas Co., El Paso 1141 miles, 6-34 inch, field and main lines, gas, facilities in Texas, New Mexico and Arizona to deliver gas to Southern Calif. Gas Co., Southern Counties Gas Co., and Pacific Gas & Electric Co., $162 million, 290 miles authorized.

500 miles, 34 inch, gas from Twin Falls, Idaho to California border near Las Vegas, Nev., planned.

Emerald Pipe Line Corp., 120 miles, 6 inch, products, from Sunray, Texas, to Tucumcari, N. M., planned.

Equitable Gas Company, Pittsburgh, Penn., development of Rhodes natural gas storage pool in Lewis County, W. Va., and construction of 11.7 miles of storage pipe line, drilling of 40 wells, and other facilities, $2,091,430, before FPC.

Four Corners Pipe Line Co., Houston, 600 miles, 16 inch, crude, from Four Corners area to Los Angeles plus 150 miles of feeder lines, $50 million, contracts let.

Great Lakes Pipe Line Co., Kansas City, Mo., 93 miles, products, from Minneapolis and St. Paul to petroleum terminal in northwestern Wisconsin, planned.

Great Northern Railway, St. Paul, 400-600 miles, 12-20 inch, crude, from Williston Basin to St. Paul-Minneapolis and Duluth-Superior areas, considered.

Harry Bass & Sons, Inc., Dallas, pipe line network from well heads to compressor stations to central gasoline plant plus line to railroad in Pembina field, Alberta, $17 million, approved.

Home Gas Co., Pittsburgh, Penn., gas facilities in New York, $3.8 million, authorized.

Humble Oil & Refining Co., 200 miles, main gathering system line of varying sizes, 250 miles, 26 or 30 inch main carrier, gas, from southwest Texas to Houston, plus gas processing and cycling plant near Corpus Christi, $75 million, planned.

Iron Ranges Natural Gas Co., 115 miles, gas, from Itasca and St. Louis counties along route of Mesabi range from Grand Rapids to Aurora, Minn., $5 million, before FPC.

Katy and New York Central Railroads, 2500-mile, 10-12 inch, LPG, from Houston, Texas, to New York, Considered.

Laurel Pipe Line Co., Philadelphia, 440 miles, 14-24 inch, products, from Philadelphia to Pittsburgh to Cleveland, $50 million, planned.

Magna Pipeline Co., 40 miles, gas, underwater line from Anacortes, Wash., to Victoria, B. C., $6 million, planned.

Michigan Gas Storage Co., Jackson, Mich., facilities in central Michigan, $2 million, authorized.

Michigan-Wisconsin Pipe Line Co., Detroit, 472 miles, 4-24-inch, gas, main line loops and extensions in Wisconsin, Illinois, $17.6 million, before FPC, temporary authorization for a part, 47.5 miles let to G. E. T. Construction, Inc.

Midwestern Gas Transmission Co., Houston, 2067 miles, 3-24 inch, gas, from Emerson, Manitoba, to Nashville, Tenn., $103 million, before FPC.

Natural Gas Pipe Line Co. of America, Chicago, 25 miles, gas, from Quinduno field in Roberts County, Texas, $3.2 million, authorized.

416 miles, 36 inch, gas, loops at various points along existing line between Beatrice, Neb., and Joliet, Ill., $76.2 million, temporary FPC authorization.

North Carolina Natural Gas Corp., 630 miles, 2-16 inch, from Transco's system near Mooresville across to southeastern North Carolina, authorized.

Northern Natural Gas Co., Omaha, 167 miles, 20 inch, gas, from Farmington, Minn. to Duluth, Minn., and Superior, Wis., $12 million, before FPC.

42 miles, 10 inch, gas, from Rochester, Minn. to Winona and Goodview, Minn., $963,000, before FPC.

365 miles, gas, new facilities in Minn., Iowa, S. D., Neb., Wis., plus 1090 miles of branch line and station facilities, $65.7 million, authorization for a part.

Northwest Pipeline Corp., Salt Lake City, 350 miles, 6-10 inch, crude and products, Four Corners area to Salt Lake City, $15 million, planned.

Ohio Fuel Gas Co., Columbus, Ohio, 56 miles, 18-24 inch, Richland County, Seneca County, Sandusky County to Toledo area, $4 million, contract for 22 miles awarded to H. L. Gentry Construction Co.

33 miles, 4 to 20 inch, various counties, Ohio, $1 million, authorized.

21.8 miles, 12¾ and 20-inch, natural gas facilities in various counties, Ohio, $1 million, authorized.

Continued on Page 74

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People along the Eastern seaboard, from the Piedmont to the Bronx, are mighty pleased with the natural gas they're getting from Transco-served utilities. They're calling on us to deliver more every year, offering the steady demand of the most people with the greatest need for clean fuel.

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TRANSCONTINENTAL GAS PIPE LINE CORPORATION

Ohio Oil Company, Findlay, Ohio, 350 miles, 12 inch, products, from Wood River, Ill. to Chicago, 84 miles let to Panama-Williams Corp.

Pacific Gas & Electric Co., 1,300 miles, gas transmission, Alberta, Canada to Antioch, Calif., $380 million, planned.

Pacific Northwest Pipe Line Corp., Salt Lake City, 1000 miles, gas, gathering system in San Juan Basin and sales laterals in Washington plus compressor facilities, $30 million, planned.

112 miles, gas, laterals, in Washington and Idaho, $4.5 million, authorized.

Facilities and horsepower additions, $5.7 million, temporary FPC authorization.

Pennsylvania Gas Co., Warren, Penn., 38 miles, 8, 10 inch, gas, in Erie and Warren Counties, Penn., and Chautauqua County, N. Y., $2.6 million, authorized.

Piedmont Gas Co., Hickory, N. C., 78 miles, 2-8 inch, gas, from connection with Transcontinental Gas Pipe Line to serve customers in North Carolina, $2.6 million, authorized.

Shell Pipe Line Corp., 100 miles, 16-20 inch, from Shell's Southwest Pass terminal to Shell's Norco Refinery near New Orleans, planned.

Southern Kansas Pipe Line Co., Inc., 200 miles, 6-10 inch, crude, southwestern Kansas to Arkansas City, Kansas, planned.

Southern Natural Gas Co., Birmingham, 60 miles, gas, to connect transmission system to reserves in Plaquemines, St. Bernard and Jefferson parishes, La., and waters adjoining, plus compressor, meter and regulating facilities, $8 million, authorized.

Tennessee Gas Transmission Co., Houston, 632 miles, 30 and 24 inch, gas from Louisiana delta to Portland, Tenn. and Coudersport, Pa. to Hamburg, N. Y., before FPC.

332 miles loop lines in Tennessee, Kentucky, West Virginia, Ohio, Pennsylvania and Mississippi, 68 miles authorized and contracts let to Harford Brothers Pipe Line Contractors, Bechtel Corporation, Oklahoma Pipe Line Constructors, Pentzien, Inc. and Collins Construction Co., sub-contractor, and 264 miles, before FPC.

Compressor stations in Mississippi, Tennessee, New York, Pennsylvania and additions in Tennessee, Kentucky, Ohio and Pennsylvania, before FPC; $167 million total.

Texas Eastern-Penn-Jersey Transmission Corp., Shreveport, La., 65½ miles, gas, from Delmont, Penn., to Lambertville, N. J., before FPC.

24,000 compressor hp additions to existing stations, $4.4 million, temporary FPC authorization.

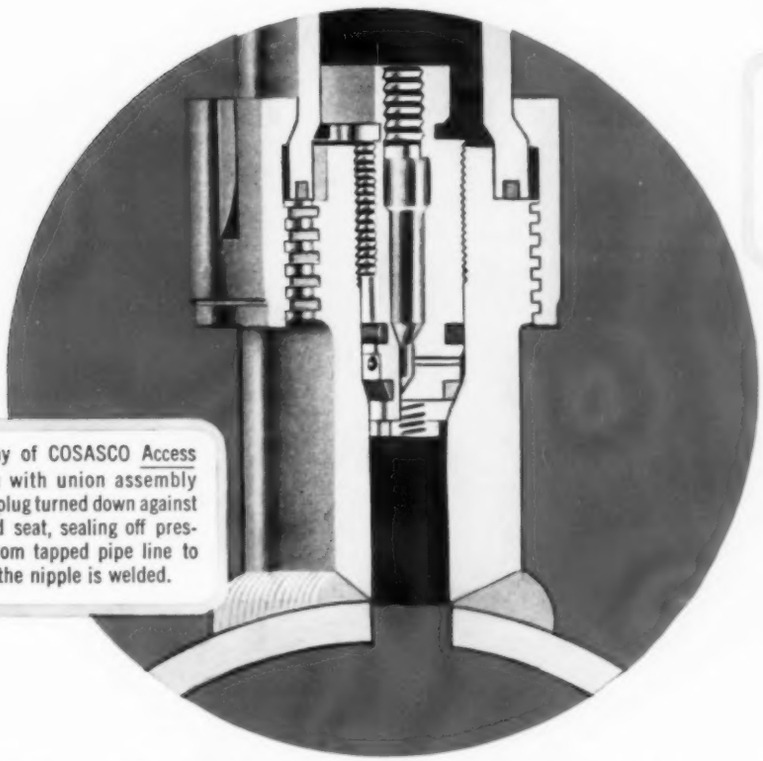
Texas Eastern Transmission Corp., Shreveport, La., 333 miles, 14, 30 inch, gas, Louisiana, Mississippi, Pennsylvania and New Jersey, $50 million, before FPC.

96.5 miles, 30-inch loop, from Kosciusko, Miss., and Uniontown, Penn.; 9.4 miles of supply laterals; a 10,250 hp compressor station, and 33,360 hp to existing compressor stations, $24.5 million, tem-

SAFE

entry against pressure

...to insert instruments, replace valves, investigate corrosion!



Cutaway of COSASCO Access Nipple with union assembly shows plug turned down against tapered seat, sealing off pressure from tapped pipe line to which the nipple is welded.

Removal and replacement of plugs is accomplished with a COSASCO "Retriever" (lubricator) of required stroke and a full-opening valve.

COSASCO *Access* Nipples give you safe and easy entry into well heads, refinery vessels, storage and transmission equipment *without interfering with operations.* They also replace expensive valves and permit removal of other externals *without loss of pressure or product!*

The COSASCO *Access* Nipple has a removable threaded plug of type 303-304 stainless steel which seals off the nipple when turned down against the tapered seat. This plug is readily replaced by special plugs for inserting corrosion coupons, water samplers, thermocouples, hydrogen probes, etc. The *Access* Nipple can also function as a gauge valve or bleeder valve.

What's your problem?

If you have an entry-against-pressure problem, we invite you to submit details. Send blue prints or drawings depicting the problem and we'll supply the COSASCO solution *without charge.* You will be under no obligation whatsoever for this service.

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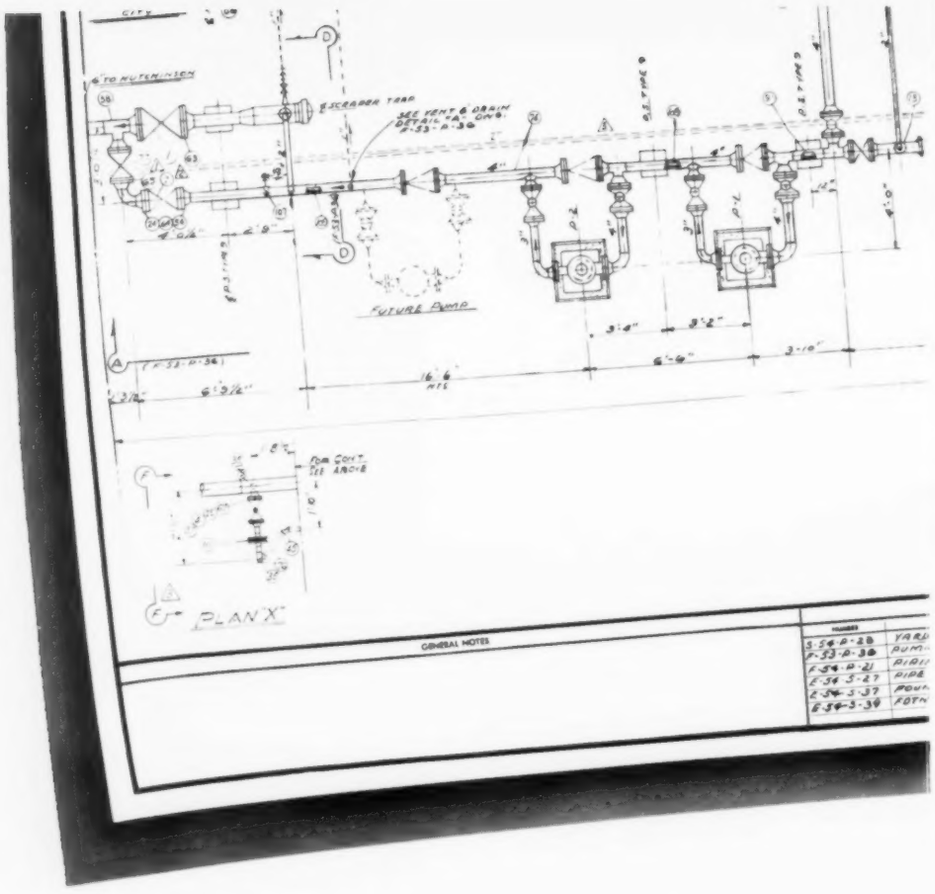

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porary FPC authorization.

Texas Eastern Transmission Corporation and Wilcox Trend Gathering System, Inc., gas compressor stations, $4 million, authorized.

Transcontinental Gas Pipeline Corp., Houston, 87 miles, 24 inch, and 56 miles, 6-10 inch, gas, gathering systems, Southeastern Louisiana, $14 million, authorized.

Trans-Western Pipe Line Co., 800 miles, 30-inch, gas. Four Corners area to California, $200 million, planned.

Underground Storage & Exploration, Upper Darby, Penn., 394 miles, 12-inch LPG, from Moundsville, W. Va. to Newark, N. J., $9 million, approved.

International

ACT Oils, Ltd., Montreal, 400 miles, crude, Dawson Creek, B. C., to Bella Coola, B. C., before B. C. government.

Alaska-Yukon Refiners and Distributors, Ltd., Edmonton, Alta., 150 miles, products, serving Alaska and Yukon territory, $3.5 million, planned.

Andes Pipeline Corp., 500 miles, 12 inch, gas, from Villamontes, Bolivia, to Antofagasta, Chile, $30 million, planned.

Burmah Oil Co., Ltd., 850 miles, crude, 20 inch, from Nahorkatiya to Calcutta, proposed.

Canada Southern Petroleums, Ltd., Calgary, 400 miles, crude, from Peace River region of northeast British Columbia to Bella-Coola, planned.

Cie. de Recherche et d'Exploration de Petrole au Sahara, 530 miles, 16 inch, crude, Edjele field in Algeria to a port on Libyan coast, planned.

Consolidated Gathering Systems, Ltd., Calgary, 198 miles, crude, Sturgeon field to Edmonton, planned.

Cuban Gas Transmission Co., 650 miles, gas, from Campeche area of Mexico across Yucatan and under Gulf of Mexico to Havana, Cuba, 120 miles would be submarine, considered.

Entre Nazionali Idrocarburi, Rome, Italy, crude, from Qum field in Iran to the Mediterranean Sea, considered.

Hydrocarbons Pipeline, Ltd., Winnipeg, Manitoba, 880 miles, 6-8 inch products from Edmonton, Alta. to Winnipeg, $35 million, partial authorization.

Iraq Joint Venture Pipe Line, 1200 miles, 38-40 inch, crude, from head of Persian Gulf through Iraq to Turkish coast of Mediterranean, $840 million, planned.

Iranian Consortium, 26 inch, crude, from Gach Saran field to proposed terminal near Bandar Mashur, planned.
16 inch, crude, from Agha Jari field to Bandar Mashur, planned.

Mene Grande Oil Co., 42 miles, 16 inch, crude, from Ceuta field in Lake Maracaibo to Bachaquero terminal, $6 million, planned.

National Iranian Oil Co., 146 miles, 6 inch, crude, from Azna to Isfahan, Iran, $5 million, planned.

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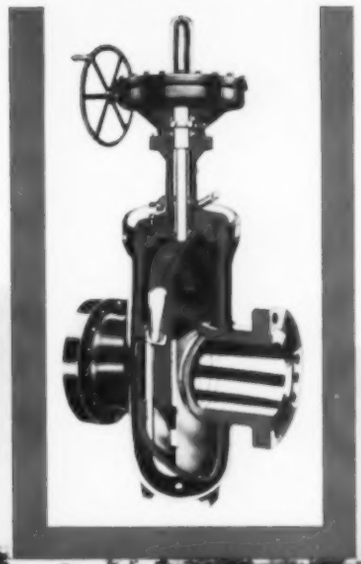
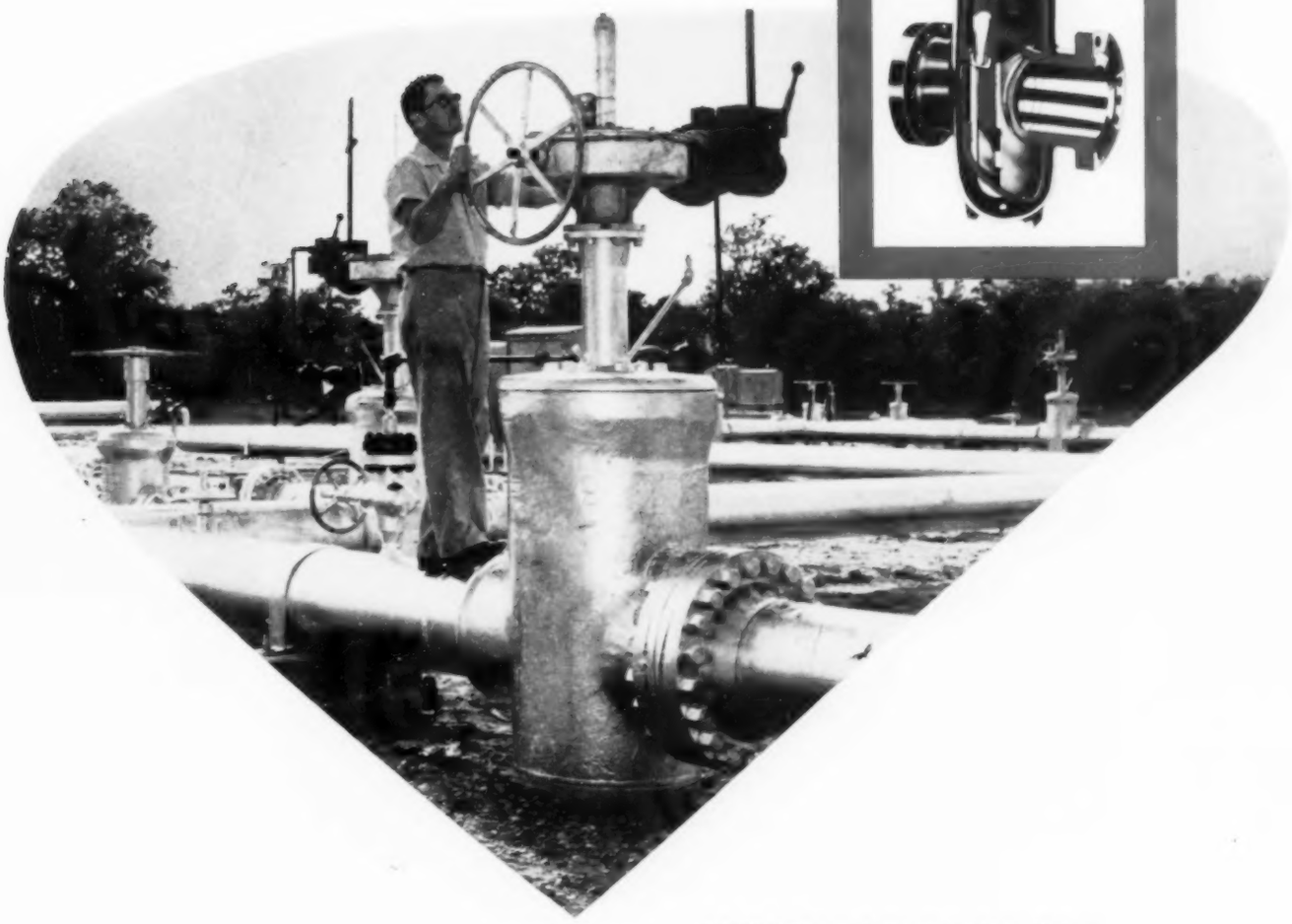
GO IN THE LINE TO STAY!





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W-K-M Through-Conduit Gate Valves stay "in the line" because their superior design provides free and easy operation, positive seal under any pressure, and freedom from turbulence and destructive erosive action.

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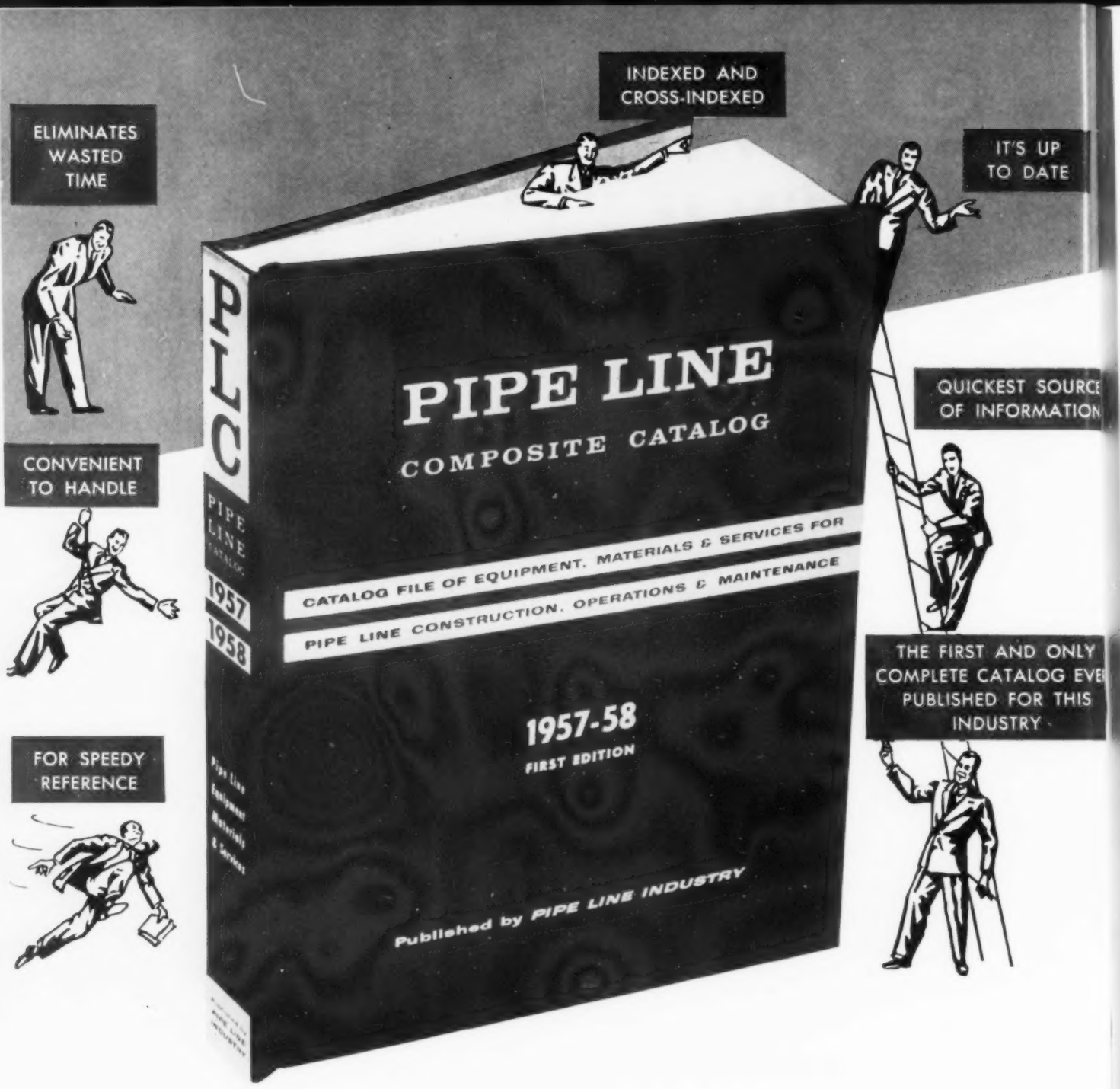

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Almost 150 leading companies have filed their complete or condensed catalogs in this useful first edition. Compiled by the manufacturers themselves, this information is arranged and indexed to offer a quick and convenient means of locating *what you want when you want it.*

If furnished to you in individual brochures, bulletins or specification sheets, the information that is now condensed into this composite catalog file would fill the equivalent of several file drawers or book shelves.

On the opposite page you'll find a complete list of the companies that have filed data in the new, specialized Pipe Line Composite Catalog. When you are looking for sales information, be sure to check these companies in your Pipe Line Composite Catalog. It is the most complete source of buying information available in one volume for this industry today.

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Falk Corp.
Farrel-Birmingham Co., Inc.
Federal Telephone and Radio Co., Division of International Telephone and Telegraph Corp.
Fish Engineering Corp.
Flexitallic Gasket Co.
Fluor Products Co., Division of Fluor Corp., Ltd.

Gardner-Denver Co.
Gaso Pump & Burner Mfg. Co.
Gearench Mfg. Co.

These leading manufacturers, suppliers and service companies have filed complete or condensed catalog data in the first (1957) edition of the new PIPE LINE COMPOSITE CATALOG. See their detailed information in the catalog when you are ready to buy.

General Electric Co.
The Gorman-Rupp Co.
Granberg Corp.
Greenhead Sling and Supply Co.
Greenwood Valve Division, Vernon Tool Co., Ltd.
Grove Valve and Regulator Co.
The Gulf Publishing Co. (Pipe Line Forms)
Gulf States Asphalt Co., Division of Bramble Industries

H & L Tooth Co.
H & M Pipe Beveling Machine Co.
Hamer Valves Inc.
Hammond Iron Works
Haynes Manufacturing Co.
Hercules Motors Corp.
Holcombe Co., Inc.
Homelite, Division of Textron Inc.
Houston Equipment Co., Inc., Division of Houston Foundry & Machine Co.
Hudson Engineering Corp.
Humble Oil & Refining Co.
Hydril Co.

Ingersoll-Rand Co.
International Telephone and Telegraph Corp., Federal Telephone and Radio Co. Division

Jefferson Chemical Co., Subsidiary of American Cyanamid Co.
Johns-Manville Corp., Dutch Brand Div.

King Tool Co., Ltd.
Kinzbach Tool Co., Inc.

L & M Company
L-K Pump Valve Co.
Ledeen Mfg. Co.
LeRoi Division, Westinghouse Air Brake Co.
Lloyd Metal Foundry
Lubrikup Co., Inc.
Lufkin Foundry & Machine Co.

Magnet Cove Barium Corp., One of the Dresser Industries
Magnetrol Inc.
S. N. M. A. R. E. P.
Marsh Instrument Co.
Mason-Neilan Division of Worthington Corp.
C. A. Mathey Machine Works, Inc.
Mavor-Kelly Co.
Maxim Silencer Co., Subsidiary of Embart Manufacturing Co.
McFarland Engineering & Pump Co.
McFarland Manufacturing Corp.
McKissick Products Corp.
Mercoid Corp.
Midwestern Pipe Line Products Co.
Mine Safety Appliances Co.
Mixing Equipment Co., Inc.
Modern Motors Sales & Service
Morris-Young-Owens Co.
Mountain States Asphalt Co., Division of Bramble Industries

Multiple Corp.
Frank W. Murphy, Manufacturer, Inc.

National Cylinder Gas Co., Tube Turns Division
National Tank Co.
Naylor Pipe Co.
Nickles Machine Corp.

Oliver Tyrone Corp., Berry Hydraulics
Oil Well Supply Division, United States Steel Corp.

Panellit, Inc.
Peerless Manufacturing Co.
Pelican Supply Co., Inc.
Penberthy Manufacturing Co., Division of Buffalo-Eclipse Corp.
Perrault Equipment Co.
Petrolite Corp., Tretolite Co. Division
Pipe Line Development Co.
Pipelife Corp.
Pittsburgh-Des Moines Steel Co.
Plyon QX, Modern Motors Sales & Service
Porter Co.
Potter Aeronautical Corp.
Protecto Wrap Co.
Pye Telecommunications Ltd.

Quality Marsh Equipment Co., Inc.

Ramsey Winch Manufacturing Co.
Reilly Tar & Chemical Corp.
Remco Manufacturing Co.
Ridgway Division, Elliott Co.
Rochester Manufacturing Co., Inc.

Schramm, Inc.
SHMCO Valves Inc.
M. B. Skinner Co.
Snelling Manufacturing, Inc.
Southern Mill & Manufacturing Co.
Sprague Engineering Corp.
Staytite Co.
D. E. Stearns Co.
N. C. Stearns Co.
Steel Forgings, Inc.
Superior Equipment Co.

Taylor Instrument Companies
Textron Inc., Homelite Division
Thermix Corp.
Thornhill-Craver Co., Inc.
Tinker & Rasor
Tretolite Co., Division of Petrolite Corp.
John D. Trilsch Inc.
Tube Turns, Division of National Cylinder Gas Co.

United States Motors Corp.
United States Steel Corp., Oil Well Supply Division

Vernon Tool Co., Ltd., Greenwood Valve Division
J. H. H. Voss Co., Inc.

W-K-M Division of ACF Industries, Inc.
E. H. Wachs Co.
John Waldron Corp.
Waukesha Motor Co.
Westinghouse Air Brake Co., LeRoi Division
Frank Wheatley Pump & Valve Mfr.
White Diesel Engine Division, The White Motor Co.
Whitmor Homebuilders, Inc.
Wickwire Rope Division, The Colorado Fuel and Iron Corp.
Wilkinson Products Co.
Worthington Corp.
Worthington Corp., Mason-Neilan Division

Yale Machine Works

PIPE LINE COMPOSITE CATALOG

Published by PIPE LINE INDUSTRY

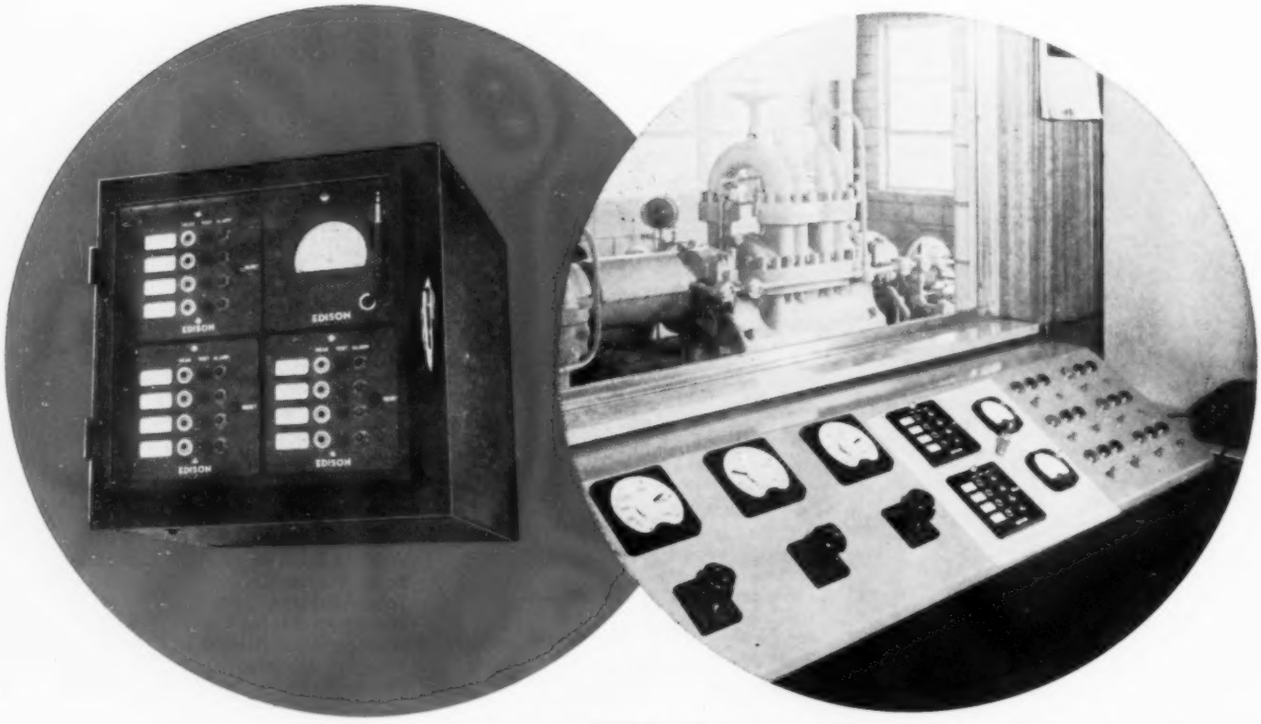
P. O. BOX 2608 **HOUSTON, TEXAS**

HOW EDISON'S OMNIGUARD PREVENTS PUMPING STATION SHUTDOWN FOR SUN OIL

Booster station shutdowns are prohibitively expensive. At the Sun Oil Company's pumping station at Rochester, Michigan, crude oil is pumped 24 hours a day, 7 days a week from Toledo, Ohio to Canada. One motor or pump shutdown would cost Sun Oil thousands of dollars in both maintenance and production costs.

The Edison Omniguard is used by Sun Oil for alarm and control purposes in connection with the operation of two major pieces of equipment — a 500 hp motor and a 6 stage centrifugal pump. Seven points are under constant surveillance by the Omniguard apparatus; namely, the two motor bearings, the two pump bearings, the two pump seals, and the pump case.

The alarm system at each point is pre-set for a given temperature, automatically warning the operator of any rise in temperature beyond the pre-set point and simultaneously shutting down the unit to prevent damage to major equipment in the pump station. All Omniguard temperature controls are located in a desk type console installed in the control room.



The following Omniguard features prompted Sun engineers to specify it for the Oakland installation:

1) Fast response
2) Quick adjustment of pre-set points
3) Ability to alarm and/or shut down selected points
4) Small physical dimensions of the sensing element
5) Explosion-proof construction at sensing element
6) Associated equipment can be installed immediately

Write for more technical details to:

McGRAW EDISON

Thomas A. Edison
INDUSTRIES
INSTRUMENT DIVISION
95 LAKESIDE AVENUE
WEST ORANGE, N. J.

1000 miles, 38 inch, crude, from central Iran to the Turkish Mediterranean coast, considered.

Northwestern Utilities, Ltd., Edmonton, 75 miles, 16-inch, from Pembina field to Edmonton, natural gas, planned.

Petroargentina, Bahia Blanca, Argentina, 370 miles, 16 inch, crude, from Newguen to Bahia Blanca, Argentina, $40 million, planned.

Petroleos Mexicanos, 150 miles, 14 inch, gas, from J. Colomo field to Minatitlan, $5 million, planned.

80 miles, 8 inch, products, from Guaymas to Los Mochis, $1 million, planned.

150 miles, 22-inch, gas, from Monterrey to Reynosa to tie into Texas Eastern system, planned.

Royal Dutch Shell Co., 155 miles, 24-30 inch, from German Rhineland to mouth of Rhine River, planned.

Royalite Oil Co., Calgary, 380 miles, crude, from Athabasca tar sand plant in northeastern Alberta to Edmonton, planned.

Saharian Pipe Line Co. (subsidiary of Cie. Francaise des Petroles, Algerie), 100 miles, 6 to 10 inch, from Hassi Messaoud field to Touggourt, Algeria, planned.

Saskatchewan Power Corp., Regina, Sask., 80 miles, gas, Hatton gas field to Success, Sask., planned.

40 miles, gas, Moose Jaw to Regina, Sask., planned.

Stanmount Pipe Line Co., 140 miles, 10 inch, crude, Cayiga and Beaver Lake fields, N. D., to connect with Interprovincial Pipe Line, planned.

Sturgeon Pipe Line Co., 100 miles, 12-inch, Sturgeon Lake field to Trans-Mountain system, $6.5 million, planned.

Sui Gas Transmission Co., Multan, Punjab, India, 145 miles, 8-inch, gas, from Sylhet to Dacca, East Pakistan, $9 million, considered.

Trans-Canada Pipe Line, Ltd., Calgary, Alta., 2294 miles 34, 30, 20 inch, gas, Alberta to eastern Canada, $378 million; 659 miles completed; contracts let for 683 miles; 735 miles to be laid in 1958.

Trans-Europe Pipe Line, 700 miles, 30 inch, main trunk, crude, from Mediterranean to northern Europe, considered.

Trans-Mountain Oil Pipe Line Co., 100 miles, loops near Kamloops, B. C. and Edson, Alta. plus pump station, tank farm and three temporary stations, $40 million, 50 miles let to Dutton-Williams Bros.

Westcoast Transmission Company, Ltd., 174 miles, 30-inch, gas, Savanna Creek gas field, Alberta, to British Columbian border, planned, $45 million.

Winnipeg and Central Gas Co., Winnipeg, Mant., 450 miles, 4-8 inch, LPG, from Tioga, N. D. to Winnipeg, Canada, $20 million, planned.

Yacimientos Petroliferos Fiscales, Buenos Aires, Argentina, 621 miles, 12-inch, products, Mendoza to San Lorenzo, Argentina, $19 million, planned.

281 miles, 12¾ inch, crude, Pichanal to San Miguel Tucuman to Techint, S. A., planned.

Transcontinental Pipe Line Corporation: 24-inch, gas, offshore from South Louisiana, planned.

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PIGGING
BUSHINGS & INSULATORS

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ROCK SHIELD

Agent for Gulf States Asphalt Co.

H & H GAS ODORIZERS
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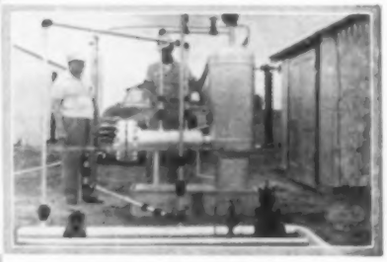

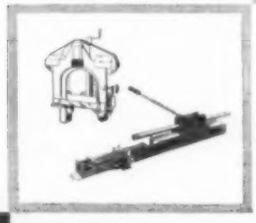

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For more data on advertised products, use Readers' Service Cards, last page.

A pipeline pumping station—powered by a gas turbine and equipped with a heat exchanger—has a decided economic edge over other stations. Manpower, for example, is as little as 20% of that needed by stations powered by diesel, steam or gas engines.

What part does the heat exchanger play? If it's an APCO extended sur-

face regenerator, it can recover up to 80% of the available heat in the gas turbine exhaust . . . and thereby cut fuel by 30%.* What's more, it takes less than 500 manhours to erect a unit on a 5000 hp cycle. Maintenance needed thereafter: zero. For details, contact:

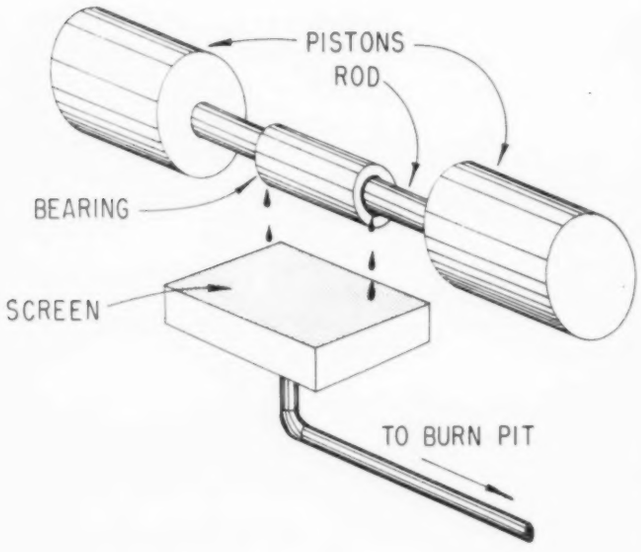
Air Preheater Corp.,
60 E. 42nd St.,
New York, N. Y.

* At 1500 F, a 6-1 pressure ratio, and a designed effectiveness of 75%.

How to do it

PIPE LINE HINTS

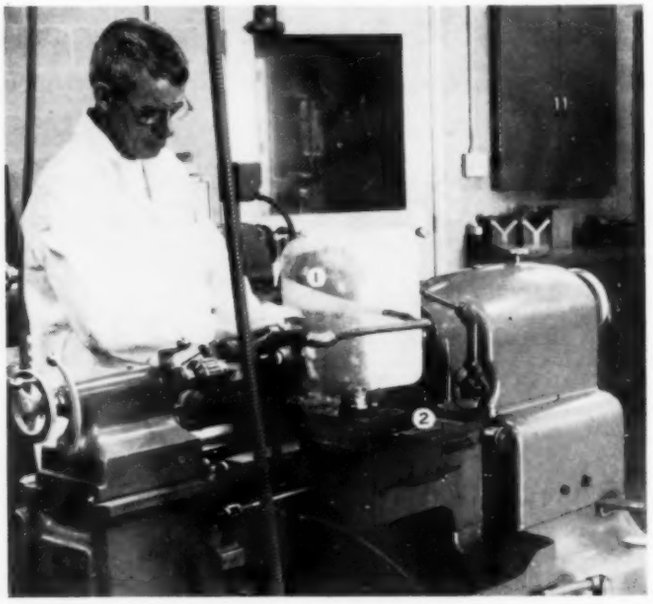
$10 is paid for each illustrated acceptable contribution. Mail to The Editor, PIPE LINE INDUSTRY, P. O. Box 2608, Houston 1, Texas



Prevent Clogged Sump Line With Light Drip Pan Screen

Sump on pipe line field pumps may be kept free of bugs and foreign matter by using a light screen across the top of the pan. The screen, placed about 1½ inches down from the top of the pan, permits oil dripping from the pump rod packings to pass quickly through to the drain sump.

Bugs and foreign material caught by the screen can be emptied as necessary. The inexpensive screen makes for better housekeeping and a free positive draining of drip oil to sump.



Solve Lathe Safety Problem By Using Shield and Trough

To prevent cutting oil being sprayed on other equipment and on the floor around the lathe, use a plastic splash shield which also simplifies housekeeping problems.

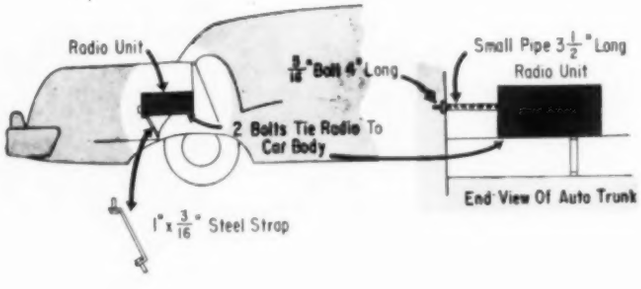
A trough installed below the shield catches the oil and returns it to the reservoir. The shield is plastic with a metal base. The trough is placed directly under the shield to catch the oil as it drips from the bottom of the shield.

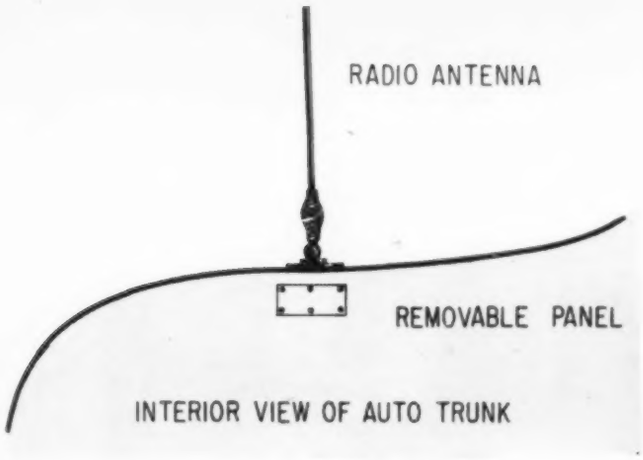
Use of the shield and trough not only saves cutting oil but also improve station shop appearance and safety by eliminating oil thrown from the working lathe.

Use One-Angle Bracket To Mount Radio in Trunk

The gas tank makes it difficult to mount two-way radio units in the trunk of cars without taking up much space. By using one angle bracket as shown and bolting the back of the unit to the frame, the radio can be installed to utilize space in the trunk.

A small pipe is bolted to the side of the unit and through the fender well. The other side of the radio is supported by an angle bracket, eliminating the necessity of vertical legs. This system allows easy access for maintenance of the unit.

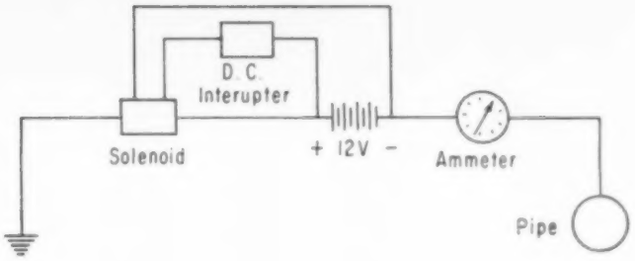

Radio Unit
3/16" Bolt 4" Long
Small Pipe 3 1/2" Long
Radio Unit
2 Bolts Tie Radio To Car Body
End View Of Auto Trunk
1" x 3/16" Steel Strap



Install Antenna in Trunk For Best Operation Place

Construction of late model cars makes it difficult to work on two-way radio antennas from the underside. Providing an opening from inside the trunk makes it possible to put the mobile antenna in the best operating position.

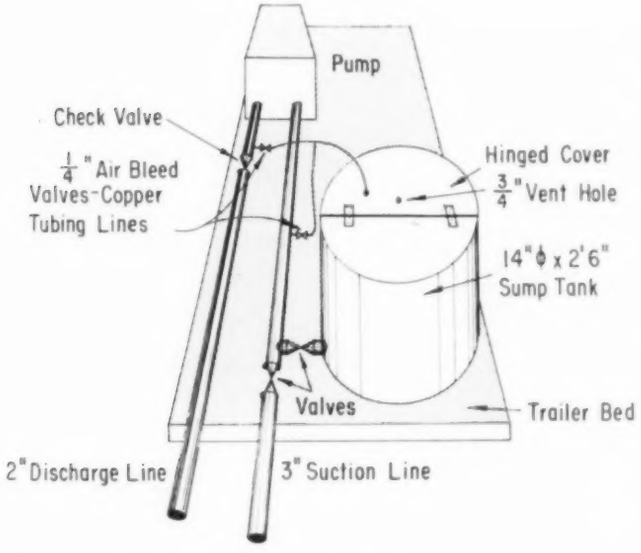
A hole is cut in the inside panel. Cover the hole with sheet metal approximately ⅜-inch larger than the hole. The patch is held in place with sheet metal screws.



Use Solenoid Interupters To Check Higher Currents

When using a DC Interrupter to make cathodic protection current requirement tests it is necessary to limit the current to 15 amps. When making the tests with a 12-volt storage battery the current may exceed this amount. By placing a solenoid interrupter in the line, higher currents may be checked without damage to the DC Interrupter.

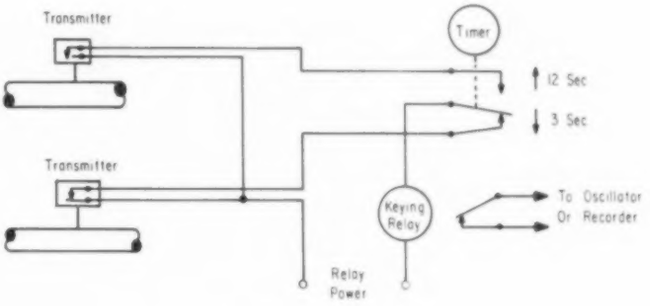
As shown in the sketch, the solenoid will be in the meter circuit and will be controlled by the DC Interrupter motor, but the DC Interrupter will be isolated from the circuit. This circuit could also be used on the output of a rectifier and eliminate the danger of working on hot leads on the AC unit.



Save Oil by Installing Sump With Portable Pump

When low production leases are pumped by means of portable pumps, several gallons of crude oil are spilled each time the unit is disconnected. Besides being untidy, it can result in loss of as much as 168 barrels of oil in a year.

Installation of a sump on the trailer with the portable pump will permit catching the hose drainings. An operator can then return the oil trapped in the sump to the lease tank until the tank is run again.



Add Repeat Cycle Timer For One Remote Recording

Two telemetered values such as pump station suction and discharge pressures can be recorded on one remote recorder by adding a double pole repeat cycle timer between the pressure transmitters and the keying relay.

Time duration transmitters must be synchronized so their "tail end" off periods coincide with the timer switch-over period. All motors should be mutually synchronous.

This method of "doubling up" is especially useful for determining the station pressure span at a glance. The recorded lines appear to have different weights at a distance. By calibrating the suction transmitter to a submultiple of the discharge pressure transmitter range, conversion at the recorder can be made by application of the appropriate multiplier.

HORSE

Since Clark introduced the world's first 2-cycle turbo-supercharged gas-engine-driven compressor in 1953, over 431,000 bhp. of these modern ultra-efficient units have been ordered by industry.

POWER

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In the Clark tradition, these TLA and TRA units don't have to be babied or pampered when the going gets rough. Because they are specifically designed for turbo-supercharging rather than being beefed-up lightweights, they possess the stamina to back you up under the most difficult load conditions. Seven years of experimental and development work *prior* to their introduction make their outstanding performance possible.

The TLA-TRA have been field-proved by over 1,000,000 compressor hours on stream.

For modern, efficient, trouble-free compressor horsepower at its best, choose a Clark TLA-TRA. Seven models from 1100-3400 bhp.

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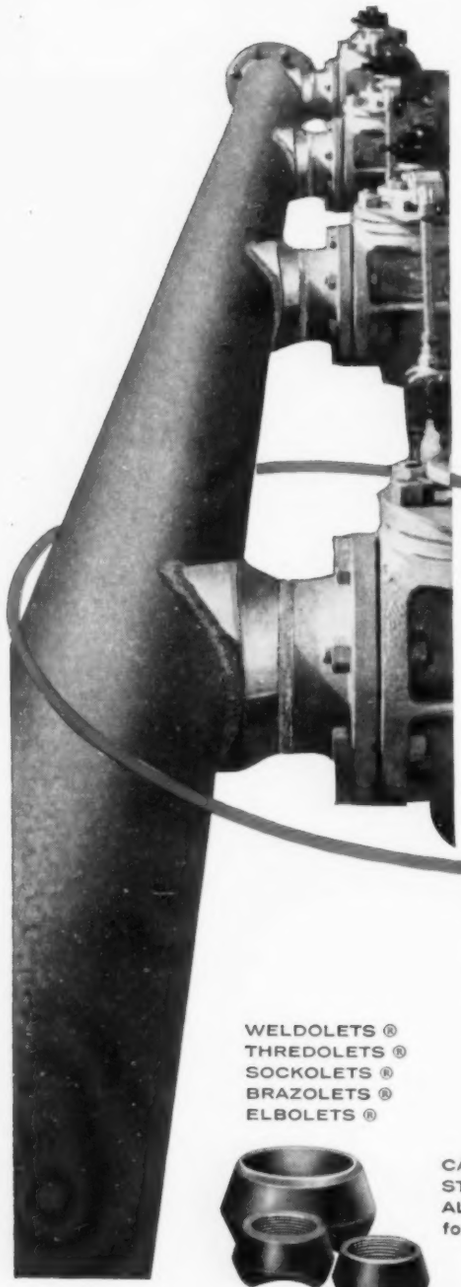

customer reduces estimate of job cost $24,000 by switch to WELDOLETS

An oil piping contract recently was reduced by $24,000 by changing specifications to WELDOLET welding fittings.

Comparable savings are possible on almost every piping contract. It will pay you to examine this positive means of reducing your piping costs. Write us for details.

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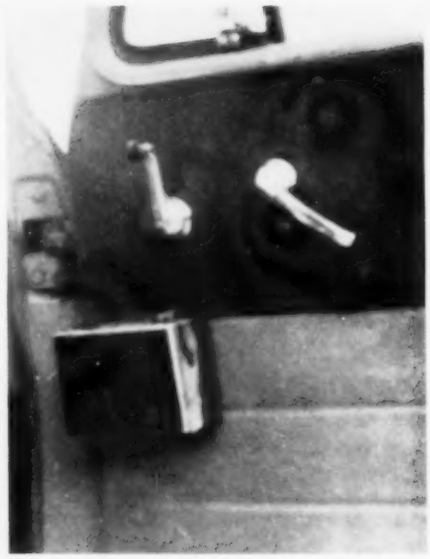


Put First Aid Box on Door Of Truck for Accessibility

One safety conscious company equips each of its field trucks with a first aid box which contains emergency items such as burn salve, medicated adhesive plasters, gauze bandages, merthiolate or mercurochrome, plus a snake bite kit.

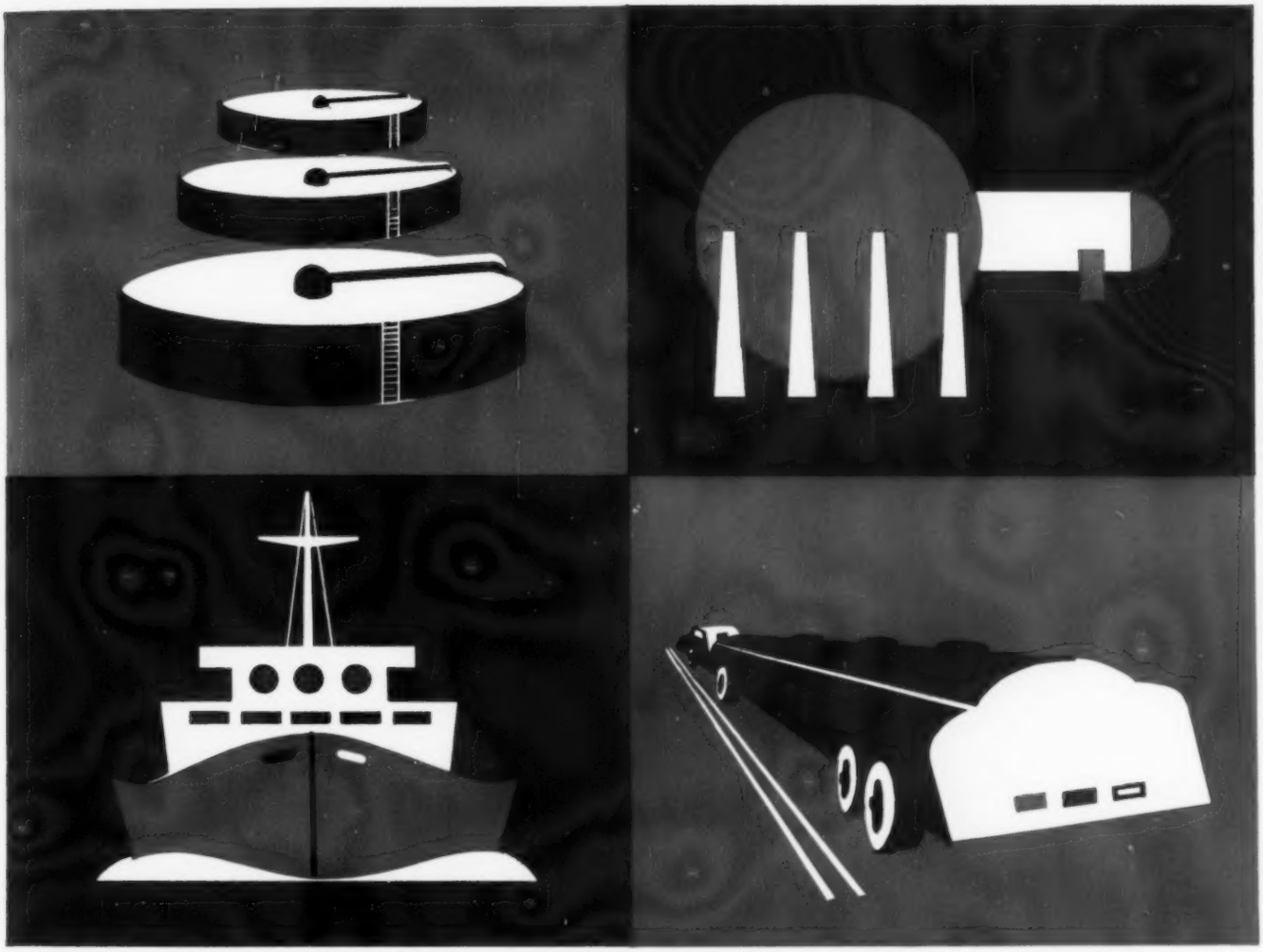
The first aid box is mounted on the inside of the right truck cab door to the front, as shown. Mounted in this location the box is readily available yet does not interfere with the operation of the crank for raising and lowering the door glass nor with the opening or closing of the door itself.

Get Gravity Oil Flow With Lowered Sump Box

A ¼-inch steel plate box sump lowered into ground below crankcase level provides gravity flow of crankcase oil from pump engine. New oil can be added to engine without first having to dispose of old oil. Sump oil can be removed at any convenient time.

Steel plate top is peaked to drain off rainfall and is fitted with sucker rod handle.

For more data on advertised products, use Readers' Service Cards, last page.



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Only Shand and Jurs offers world-wide availability and service on mechanical fittings — vents, gages and valves — for storage tanks. Stocks are maintained in key cities for prompt delivery to your tank farm, yard or depot.

Proved by over 36 years service, S&J tank fittings have set the industry standard for economy, safety, accuracy and dependability. Call or write your nearest S&J office for catalog and prices on the type of fittings you need.

S&J is also a world-leader in the manufacture of electrical remote supervisory control equipment.

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4440

Chain on Regulator Lever Controls High Flow Rate

When testing meters, a short chain on the lever of the regulator will keep the highest flow rate low enough to keep the pen on the chart.

The regulator is weighted shut to provide the proper back pressure. The chain is hooked around the meter run and connected to the end of the regulator stem, preventing the regulator from opening its full distance.

When the desired rate is obtained, the chain becomes taut and any excess gas is released through the relief valve on the vent line.

Make Lathe Tool Rack From Available Materials

Make this handy storage rack for your lathe tools out of plywood, scrap lumber and pipe. The board is made out of ¾-inch plywood, as is the stop-strip at the bottom of the board. Drill holes on either side at the top of the board for the lathe's bell center and live center. The boring bars are held on wooden blocks attached to the board and shaped to fit. One-inch pegs in the center of the board accommodate the boring holders.

On either side of the boring-bar holders, pegs are installed for the lathe box wrenches, and a row of wooden blocks is arranged along the bottom of the board to hold various tools. The board is attached to a ¼-inch steel plate, which is welded to a 1½-inch pipe. This pipe rotates inside a 2-inch pipe welded to a base of ⅜-inch plate. A machinist can rotate the board with a minimum of effort.

The base may be attached to the floor for a permanent installation, or moved from one location to another. The board may be removed from the base, leaving only the 2-inch riser for easier access to the lathe.

Special Body Construction Makes a Double-Duty Truck

A special body which is constructed on gang truck body enables the truck to serve as a dump truck. In addition to having special compartments for all tools, the hoist is used

FLEXIBLE
RUBEROID ROCK SHIELD
means extra safety in extra tough areas

Oil and gas pipelines need extra protection from rock abrasion and penetration in areas such as mountain cuts and river crossings. Ruberoid *Flexible* Pipeline Shield is the made-to-order extra protection to insure long, maintenance-free pipeline performance.

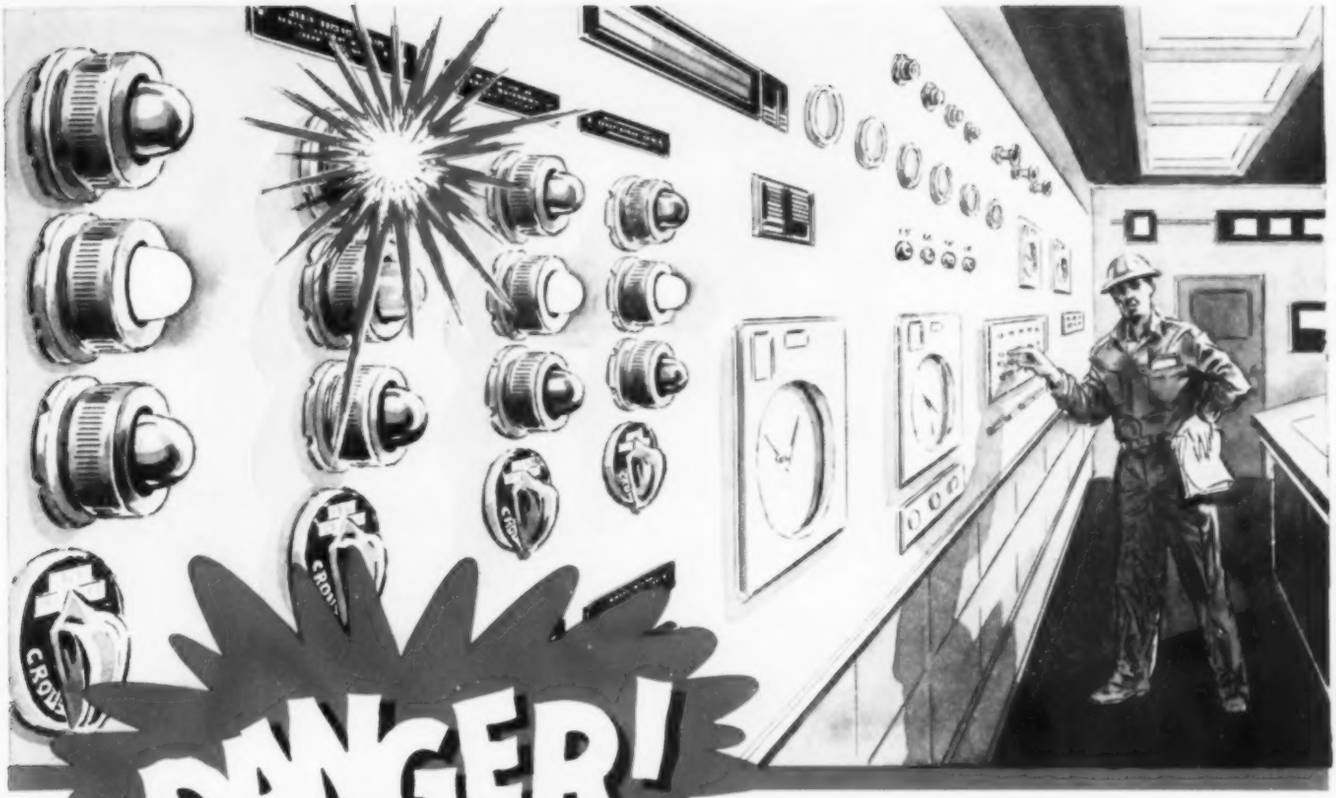
Ruberoid Pipeline Shield is made of premium felt, saturated with Bitumen and lined on one side with a tough kraft crepe paper to provide more flexibility. This rugged, durable covering will withstand extremes of abrasion and penetration and keep lines in service without costly repair interruptions.

Ruberoid Pipeline Shield is easy to apply right over the standard felt and enamel outer covering. It is available in 8′ to 10′2″ lengths . . . in widths from 17″ to 60″ to fit any size pipe. One or two man crews can install it quickly with 1″ metal strapping. Seals (600 per 1000′) are just as simple to install.

When laying pipelines in extra tough areas, add an extra margin of safety with Ruberoid Pipeline Shield. It will provide extra years of trouble-free service.

The RUBEROID Co.

Executive Offices: 500 Fifth Avenue, New York 36, N. Y.
Western Division Offices: 307 N. Michigan Ave., Chicago 1, Ill.



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In oil refineries, chemical plants, synthetic rubber plants — wherever constant watch of processing is necessary — Crouse-Hinds Condulet® *Visularms* provide visual indication of process conditions, and instant control of manufacturing equipment.

By means of pilot lights (and bell, horn or siren signals where desired) *Visularm* indicates normal or abnormal temperature, liquid level, pressure, or other conditions which can be electrically coupled to the circuit.

Explosion-proof or dust-tight and weather-resistant construction* assures maximum safety in hazardous locations. Compact designs minimize space required on control or panel boards . . . are easy to install.

A Visularm system delivers substantial savings by eliminating the necessity for buying individual components . . . housing them . . . and wiring your own system completely.

Two- or three-light styles may be mounted either vertically or horizontally. For audio warning, any number of *Visularms* may be used to operate a single horn, bell or siren.

Visularms are just one of hundreds of items in process control board equipment offered by Crouse-Hinds. Only a few are shown at left. For full information on the complete line, call your nearest Crouse-Hinds distributor, or write . . .

*Dust-ignition-proof.

A NATIONWIDE DISTRIBUTION exclusively through ELECTRICAL DISTRIBUTORS

CROUSE-HINDS COMPANY

Main Office and Factory: Syracuse, N. Y.
Crouse-Hinds Company of Canada, Ltd.: Toronto, Ont.

Offices: Baton Rouge Birmingham Boston Buffalo Chicago Cincinnati Cleveland Corpus Christi Dallas Denver Detroit Houston Indianapolis Kansas City Los Angeles Milwaukee New Orleans New York Philadelphia Pittsburgh Portland, Ore. Salt Lake City St. Louis St. Paul San Francisco Seattle Tulsa Washington RESIDENT REPRESENTATIVES: Albany Atlanta Baltimore Charlotte Chattanooga Jacksonville Reading, Pa. Richmond, Va. Shreveport

to raise the bed when used as a dump truck.

One of the newest innovations is an automatic cut-off switch for the hoist which lifts the truck bed. In case the driver should forget to stop the bed when it is lifted, or if he should be busy doing something else, the cut-off switch will automatically shut off the hoist motor when the bed has reached an upright position.

Conversion of the gang truck in this manner makes it a very versatile piece of equipment.

Handle Lube Oil Disposal With Gravel-Filled Sump

To keep a neat appearance around a pipe line transfer pump when handling oil from lease tank batteries into the pipe line, one operator installed this sump. A hole was dug into the ground large enough to hold the top half of a 55-gallon drum. It was then filled with large gravel or rocks to about two feet from the top and the top half of the drum was installed so that it protruded only about two inches above the surface of the ground. A cement slab was then laid around the top of the barrel.

The drum lid covers the "sump" and helps to improve the appearance of the location.

Here is the **ALLEN-HAMILTON**

a precision power grader

British-built and best, the robust ALLEN-HAMILTON Model 50 incorporates accurate hydraulic control for all kinds of highway grading and other precision work, with a range of speeds from 1.9 to 14 m.p.h. to meet all conditions. Power unit is the McCormick International Farmall Super BMD-50.5 BHP diesel with electric starting.

Attachments include front bulldozer blade and scarifier (both hydraulically operated). Leaning front wheels are also available.

JOHN ALLEN & SONS (OXFORD) LTD COWLEY OXFORD ENGLAND

ATLANTA GAS LIGHT COMPANY INCREASES PROPANE STAND-BY

The 1956 addition to Atlanta Gas Light Company's liquid propane storage expansion program, which began two years ago, consisted of twenty 30,000 gallon tanks. The total stand-by propane-air capacity serving Atlanta became 2.7 million cubic feet per hour from 78 tanks like those pictured. The white stacks mark the location of 20 tanks installed during two preceding years. The 1957 expansion program will provide for 20 additional tanks at this plant and seven in other properties.

Underground protection of these tanks begins at the tank fabricating shop, where a special Royston inhibitive, insulating primer is applied. At the installation site the tanks are given a spray coat of Roskote Mastic. This is followed by a fog coat of non-conductive, contrast paint. The latter insures complete coverage of the second spray coat of Roskote Mastic, which completes the prescribed underground protection.

The Atlanta Gas Light Company has similar installations in Waycross, Macon, Valdosta, Rome and Athens.

If you are planning an underground or above ground installation of tanks, or piping, write for complete information on the Roskote time-proven, economical protective coating system.

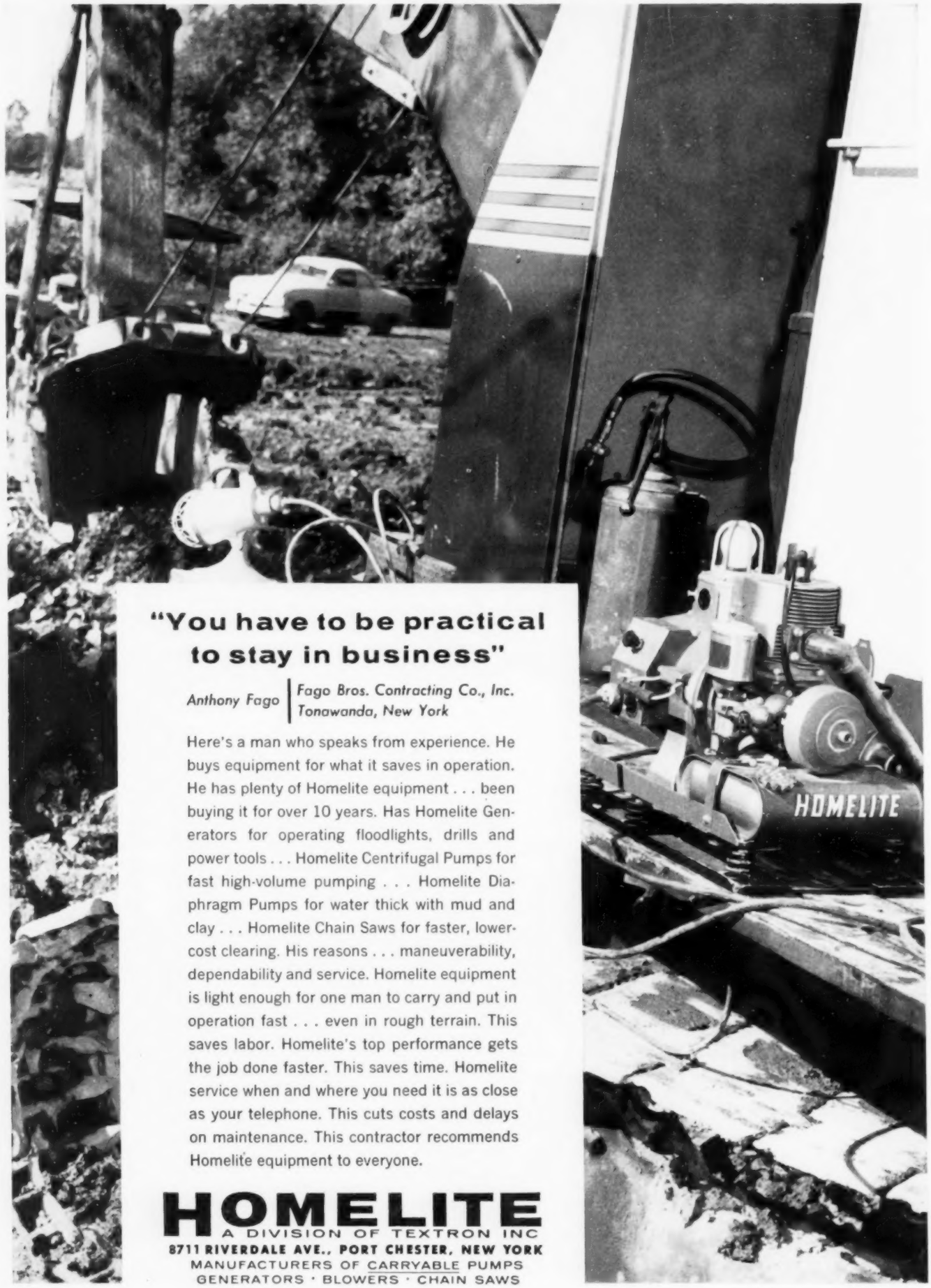
Royston Laboratories, Inc.
Box 112-D, Blawnox, Pittsburgh 38, Pa.

ROSKOTE

BRANCH OFFICES IN ATLANTA, CHICAGO, HOUSTON, PHILADELPHIA, SAN DIEGO AND TULSA. WAREHOUSED IN NORTHEAST, SOUTHEAST, NORTH CENTRAL AND SOUTH CENTRAL REGIONS.

For more data on advertised products, use Readers' Service Cards, last page.

FOR MEN WHO BUY EQUIPMENT FOR WHAT IT SAVES



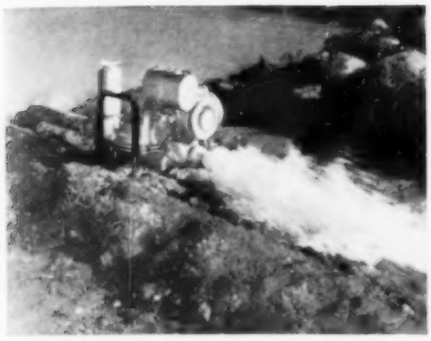
"You have to be practical to stay in business"

Anthony Fago | *Fago Bros. Contracting Co., Inc.*
Tonawanda, New York

Here's a man who speaks from experience. He buys equipment for what it saves in operation. He has plenty of Homelite equipment . . . been buying it for over 10 years. Has Homelite Generators for operating floodlights, drills and power tools . . . Homelite Centrifugal Pumps for fast high-volume pumping . . . Homelite Diaphragm Pumps for water thick with mud and clay . . . Homelite Chain Saws for faster, lower-cost clearing. His reasons . . . maneuverability, dependability and service. Homelite equipment is light enough for one man to carry and put in operation fast . . . even in rough terrain. This saves labor. Homelite's top performance gets the job done faster. This saves time. Homelite service when and where you need it is as close as your telephone. This cuts costs and delays on maintenance. This contractor recommends Homelite equipment to everyone.

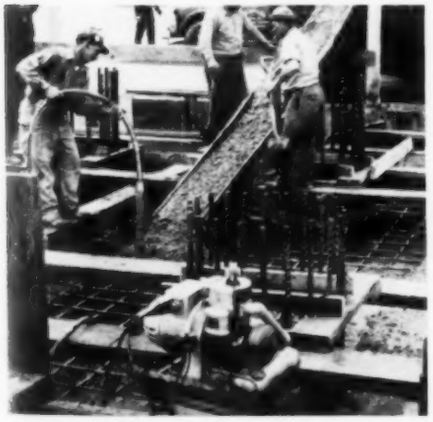
HOMELITE
A DIVISION OF TEXTRON INC
8711 RIVERDALE AVE., PORT CHESTER, NEW YORK
MANUFACTURERS OF CARRYABLE PUMPS
GENERATORS · BLOWERS · CHAIN SAWS

Full Line of Carryable Construction Equipment Now Offered by Homelite



Carryable Diaphragm Pump . . . This self-priming, 120 pound diaphragm pump will handle water in the thickest sand, muck, or mud. Capacity: 5,000 g.p.h. Size: 3". Complete line of centrifugal pumps are also available in sizes from 1½" to 3".

Chain Saws For Every Job . . . Now you can choose from a full line of lightweight, powerful Homelite chain saws. From 3½ to 7 horsepower . . . 19 to 29 pounds. Brush cutting and clearing attachments are available to handle all your cutting jobs.



One-Man Electric Vibrator . . . It takes only one man to place concrete with powerful, Homelite high-cycle or universal electric concrete vibrators. Carryable Homelite generator provides power for high-cycle vibrators *and* 110 volt DC for all universal vibrators, tools and floodlights.

HOMELITE

a division of Textron Inc.

PORT CHESTER, NEW YORK

What's Happening

among MEN in the INDUSTRY

O. Q. Lomax, recently retired president of **Humble Pipe Line Company**, has been named a new director and special pipe line consultant of **Sharman, Allen, Gay and Taylor, Inc.**, pipe line contractors of Houston.

O. Q. Lomax

Lomax will set up offices at 310 Esperson Building, Houston.

He was affiliated with Humble for 39 years. In 1942 he was made vice president and general manager and was elected to the board of directors. Eight years later he became president.

•

L. J. White has been promoted from district superintendent of **Magnolia Pipe Line Company's** Houston-Beaumont District to division superintendent of the Southern Division. He has been moved from Beaumont to Houston. **R. E. McDonald** has been transferred to Alice, Texas, as district superintendent of the Southwest Texas District. **Homer Cranfill** has been moved to Wichita Falls, Texas, as district superintendent of the company's North Texas District. He was formerly district superintendent of the Southwest Texas District.

J. R. Dean was reassigned to Beaumont as district superintendent of the Houston-Beaumont District. He was formerly district superintendent for the North Texas District at Wichita Falls. **L. A. Foy** has been promoted from district superintendent of the West Texas District at Midland to assistant division superintendent of the Western Division. **J. J. Harris** has been moved to Midland to replace Foy as district superintendent of the West Texas District.

•

Robert M. Hoffer is the newly appointed controller of **Michigan Wisconsin Pipe Line Company** and **American Louisiana Pipe Line Company**, interstate pipe line system, as well as controller of the **American Natural Gas Service Company**, financial and engineering servicer for American Natural Gas Company subsidiaries.

R. M. Hoffer

A specialist in accounting, tax, financial and rate matters of public utilities, Hoffer is formerly a partner in the public accounting firm of Arthur Andersen & Company.

Howard Boyd is the new executive vice president of **El Paso Natural Gas Company.** He has been a vice president and assistant general counsel of El Paso since he joined the company in 1952. He is vice chairman of Pacific Northwest Pipeline Corporation board and an officer and director of other El Paso subsidiary companies.

Boyd was formerly a partner in the law firm of Hogan & Hartson of Washington, D. C., and is a former assistant U. S. district attorney for the District of Columbia. He is a past attorney with the Department of Justice.

•

Joe Boyd is general manager and **Neil VandeSchraaf** is office manager of the recently formed subsidiary company of **Somerville Construction Company** in Peoria, Ill. The company will be known as the **Somerville-Illinois Company** and will specialize in the construction and maintenance of gas pipe lines and distribution systems in the central states area.

•

C. E. Coffey has been appointed superintendent of the **Texas Gas Transmission Corporation's** Compressor department, Kentucky and Indiana division. He is a veteran of 23 years experience in natural gas compressor station operation with Texas Gas and a predecessor company. Coffey has been manager of the Texas Gas compressor station at Jeffersontown since 1949. Compressor stations located at Calvert City, Slaughters, Hardinsburg and Jeffersontown, Ky., and at Dillsboro, Terre Haute, Oaktown and Petersburg, Ind., will now come under his supervision.

C. E. Coffey

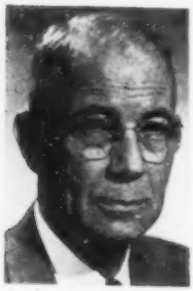
•

Nelson Miner & Company, consulting engineers, formerly of Dallas and Lubbock, Texas, has consolidated operations and moved into new offices at 6936 San Pedro in San Antonio, Texas, where they will be associated with **Ward Construction Company.**

President of the firm is **Welbert Ward; Nelson Miner** is an officer.

•

Cities Service Pipe Line Co. management and personnel has recently moved from Bartlesville's Cities Service building to the Petroleum Building in Bartlesville's eastside business development. Involved in the move will be approximately 25 Cities Service pipeliners, including **President B. D. Leuty** and **Harry Nelson**, vice president and manager.



A. E. Pecore

W. S. Spangler

A. E. Pecore, vice president of **Humble Pipe Line Co.**, has been named president of the organization, replacing **O. Q. Lomax** who has been president since 1950. **William S. Spangler**, who has been serving as general superintendent, replaces Pecore as vice president and **P. D. Phillips, Jr.** has been promoted to general superintendent and has been named a director of the company.

P. D. Phillips, Jr.

Pecore came to Humble in 1919 as a draftsman in the Houston office. Since that time he has been chief draftsman, assistant civil engineer, chief engineer and general superintendent, and then became vice president in 1950.

Spangler went to work for Humble Pipe Line Co. as a pipeliner in the East Texas division in 1933. He has served as office engineer and assistant division superintendent and became general superintendent in 1951 and a director in 1955.

Phillips also started his career with Humble as a pipeliner but in 1934. He was transferred in 1937 to the West Texas division as a field engineer. He has been assistant chief engineer, chief engineer, and became assistant general superintendent in 1956.

•

John H. Kime has recently joined **Preston Oil Company** as vice president. Kime formerly was superintendent of production and storage at **United Fuel Gas.** Both United Fuel and Preston Oil are operating companies of Columbia Gas System. Kime was first employed by United Fuel in 1946.

•

Natural Gas Pipeline Company of America has announced several appointments for its Fritch, Texas, Beatrice, Neb., and Minneola, Kansas locations. **T. R. Brennan** has been named field superintendent of compressor stations (gathering system), and **J. E. Bullock** was named field superintendent of compressor stations (mainline). **L. L. Stallard** and **D. R. Wendele** were appointed superintendent and assistant superintendent, respectively, at the Fritch station. **C. J. Fitzgerald** is the new superintendent of the Minneola station. Brennan succeeds the late **G. W. Gibbs.**

•

Clyde C. Copper is the new superintendent of measurements for **Northern Natural Gas Company** replacing **J. L. Griffin** who retired recently after 27 years service. Copper has been with Northern Natural 25 years and has been assistant superintendent of measurement since 1948.

C. C. Copper

•

Audley E. Harnsberger has been elected president of **Pure Transportation Co.**, wholly owned pipe line subsidiary of the **Pure Oil Co.** He succeeds **J. W. Meehan.** Harnsberger has been with Pure Oil for 33 years.

•

Standard Oil Company has appointed three new terminal superintendents. **Robert D. Haack** is new superintendent at Escanaba, Mich., **Earl R. Swett** succeeds Haack as superintendent at Milwaukee, Wis., and **Dwight Browning** replaces Swett at Peoria, Ill.

Haack will be in charge of the Lake Michigan marine terminal now under construction at Escanaba which will have storage facilities for year-round products delivery to 22 communities in six Upper Peninsula counties. Swett has been employed at Peoria since he started with Standard Oil in 1944. Browning has held various positions in Iowa and Minnesota during his 20 years with the company.

Stability

KEY FIELD PERSONNEL

Form a Permanent Part of Our Organization

Houston
CONTRACTING COMPANY
GENERAL CONTRACTORS
Laurence H. Favrot • R. P. Gregory • Geo. A. Peterkin

OIL • GAS
GASOLINE
WATER PIPE LINES

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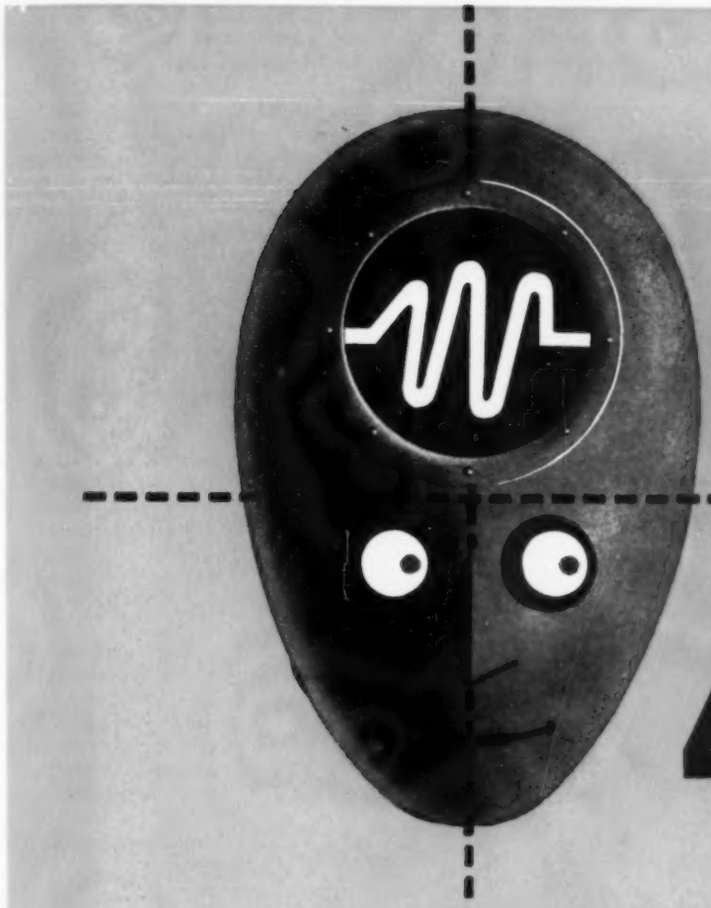
HOUSTON 6, TEXAS



THE E-I-M

FUTRONIC

VALVE CONTROL

masterminds

48,000

barrels a day,

For complete details of the FUTRONIC valve control write

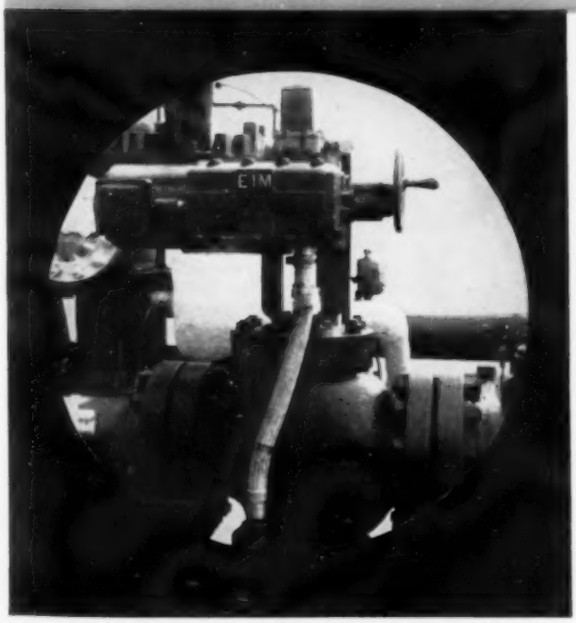
E-I-M

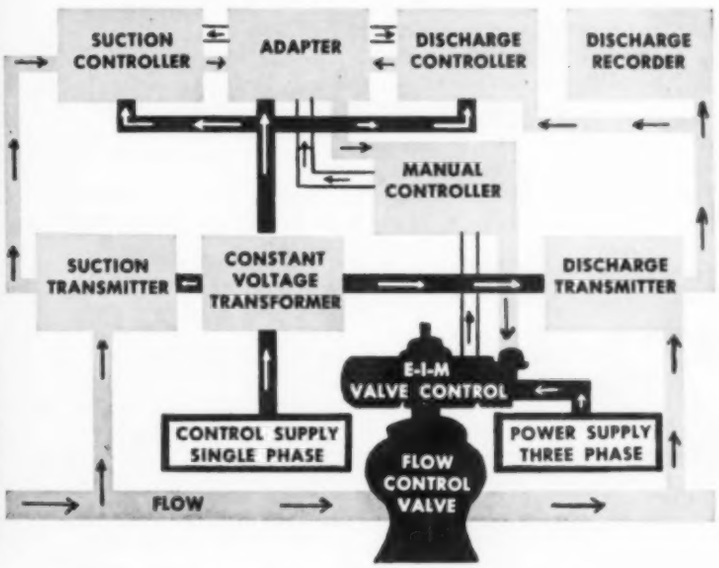
COMPANY, INCORPORATED
1340 Old Spanish Trail
Houston 25, Texas

The FUTRONIC regulates this crude oil output at a fully automatic, completely unattended pumping station in Southern Oklahoma.

The FUTRONIC valve control system, is particularly valuable in meeting pipe line compressor station, pipe line pumping station and metering station requirements.

Units are adaptable for readout, cascading, computer and similar systems. Transmission distances of great length are permissible and it is possible to tie in with leased wire, micro-wave and other metering systems.





For more data on advertised products, use Readers' Service Cards, last page.

D. R. Ford

J. E. McGeath

Don R. Ford, vice president and former assistant manager of **Magnolia Pipe Line Co.,** is the new manager of the firm. Other recent appointments in the organization affect **J. E. McGeath,** former general superintendent who is the new assistant manager, and **M. E. Powell,** former assistant general superintendent who will succeed McGeath.

M. E. Powell

Ford has been with Magnolia since 1927, serving as laborer, district gager and chief gager and moving through supervisory posts in Texas and Oklahoma. He was elected a director of Magnolia Pipe Line in 1951 and made vice president in 1952.

McGeath has served as general superintendent since 1954. He came to Magnolia in 1923 as a laborer. His beginning service in the Smackover Field, Ark., was followed by duties of increased responsibility in Louisiana, East and West Texas fields, and in Houston and Alice, Texas. He came to the Dallas offices of the company as assistant general superintendent in 1946 and has served as a director of Magnolia Pipe Line since 1956.

Powell joined Magnolia in 1931. Serving successively as field, district, and chief gager, he was made a district superintendent at Luling, Texas, in 1945, assistant division superintendent at Oklahoma City in 1946, and division superintendent in Midland in 1949. He has been located in Dallas since 1955.

•

Warren L. Taylor has been named to the newly created position of chief geologist for **El Paso Natural Gas Company.** He served recently as division superintendent for the company at Salt Lake City, Utah.

W. L. Taylor

Four geological division superintendents have also been announced. **A. E. Miller, Jr.,** former company geologist at Salt Lake City, has been transferred to Amarillo as superintendent of the new division office. Other appointments affect **J. G. Wilkins** who was named Salt Lake division superintendent, replacing Taylor; **Roy L. Prichard** who was named Farmington, N. M., superintendent, replacing **W. L. Speer,** and **Larry C. Zink** who was named Midland, Texas, division superintendent, replacing **Roy Allen.**

Both Allen and Speer were recently transferred to **El Paso Natural Gas Products Company,** wholly owned subsidiary, where Allen will be chief geologist and Speer will be division geologist.

•

Jack K. Horton, vice president of **Pacific Gas and Electric Company,** has been elected president and chief executive officer of **Alberta and Southern Gas Co., Ltd.,** a newly organized company which will purchase surplus Canadian natural gas for the California market.

Formation of the company and election of its officers were announced recently in Calgary, Alberta, as the first major step in plans for a $330,000,000 transmission project to augment California's gas supplies with Canadian gas, beginning in 1960.

Six Americans and seven Canadians were named to the board of directors of Alberta and Southern Gas Co. In addition to Horton they are **James B. Black,** chairman of the board of PG&E who was named chairman of the board of the new company; **S. M. Blair,** of Toronto, president of Canadian Bechtel who was named vice chairman; **N. R. Sutherland,** president and general manager of PG&E; **R. H. Gerdes, J. S. Moulton** and **P. E. Beckman,** all PG&E vice presidents; **Ross MacKimmie, J. E. A. MacLeod, C. O. Nickle** and **R. L. Winton,** all of Calgary, and **H. R. Milner** and **D. K. Yorath,** both of Edmonton.

Priced Lower than conventional coatings, LION E-120 has many other characteristics which result in savings without sacrifice of the quality required by corrosion engineers of the oil and gas industry.

Greater Coverage per ton, due to its specific gravity, cuts cost per foot for a given thickness of coating.

Labor Savings result from packaging in easy-to-handle, easy-to-chop containers weighing from 120 to 175 pounds.

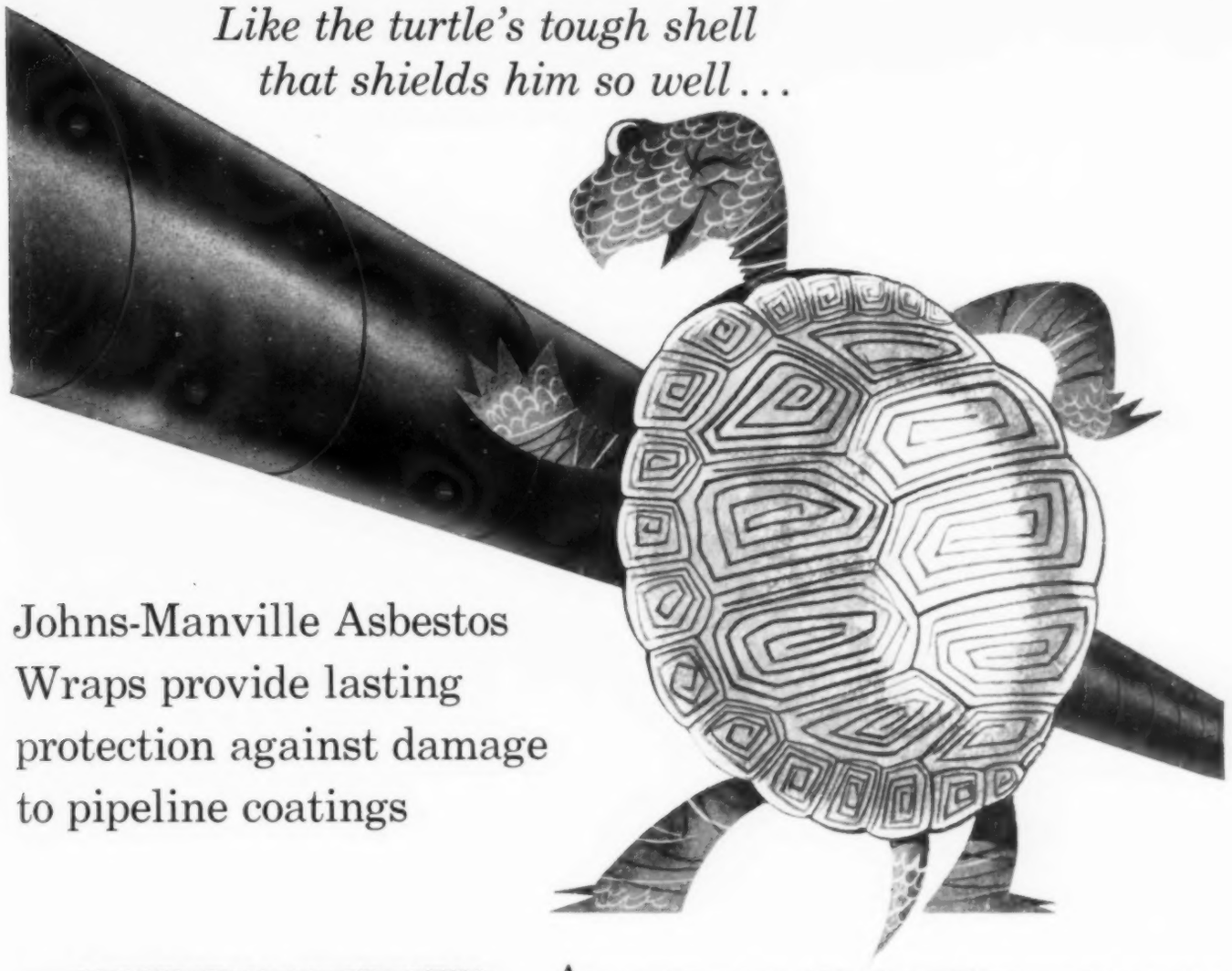
Favorable Insurance rates at substantial savings are offered and extra labor costs are avoided because LION E-120 has no toxic fumes — creates no safety hazard.

Write for complete specifications on this cost-cutting LION E-120 *coating. And ask for literature on other* HOLCOMBE *corrosion prevention products.*

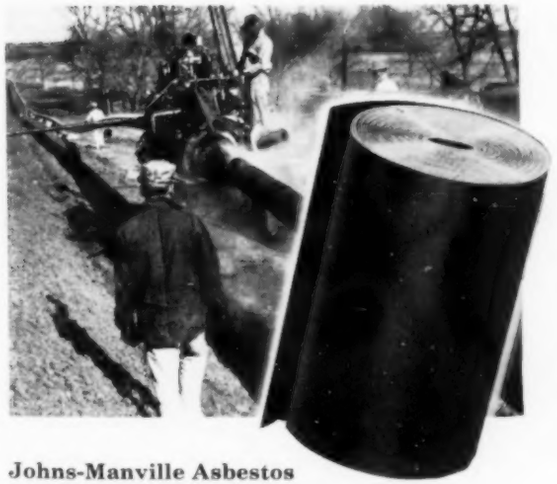
THE **HOLCOMBE** COMPANY, INC.
FIRST NATIONAL BANK BUILDING TELEPHONE 5-3468
SHREVEPORT, LOUISIANA
HOLCOMBE COMPANY OF CANADA, INC.
323 BARKER BUILDING TELEPHONE 6-7291
CALGARY, ALBERTA, CANADA

Lion Coatings • Holcombe Selenium Rectifiers
Pipe Wrappings • Graphite Anodes • Coke Breeze

Like the turtle's tough shell that shields him so well...



Johns-Manville Asbestos Wraps provide lasting protection against damage to pipeline coatings



Johns-Manville Asbestos Felt is available in 3 types for field application or mill wrapping:

#15 Asbestos Felt—the high-strength, uniform asbestos wrap that has given superior protection to pipe coatings for more than 30 years—under the most severe soil conditions.

#15 Transhield®—heavyweight asbestos felt with parallel glass reinforcement for high tear strength.

#8 Transhield—standard-weight asbestos felt with parallel glass reinforcement—for low-cost protection against average soil conditions.

AS FAR BACK as 1915, J-M Asbestos Wraps were being used to protect pipeline coatings. As a matter of fact, in the early twenties Johns-Manville also played a leading role in the development of equipment for mechanically applying protective coatings and wraps at the same time. The introduction of this equipment brought about uniform application of coatings and wraps . . . prolonged the effective life of protected pipelines.

Today, Johns-Manville Asbestos Wraps have a performance record of over forty years on job-proved installations representing nearly a quarter of a million miles of pipeline. And tests made recently by a leading firm of consulting engineers showed Asbestos Wraps provide the most effective single protection against earth loads, soil stress and other forces that weaken coatings and permit corrosion of the pipeline.

Invite one of our engineers to show you why J-M Asbestos Wraps have been the standard for the industry—and while he is with you, ask him to let you see the results of a three-year, extensive test program of "Pipeline Coatings and Wrappers." Write to Johns-Manville, Pipe Division, 22 E. 40th St., New York 16, N. Y.

STRONG PROTECTION ✓ **PROVEN PERFORMANCE**
RESISTANCE TO SOIL STRESS AND DEFORMATION
HIGH-SPEED APPLICATION • LONG-TERM INVESTMENT
SIMPLIFIES CATHODIC PROTECTION SYSTEMS
REDUCES HAZARD • INCREASES SAFETY

JM PRODUCTS

JOHNS-MANVILLE

For more data on advertised products, use Readers' Service Cards, last page.

Horton was president of **Pacific Public Service Company** and also its subsidiary, **Coast Counties Gas & Electric Company**, San Francisco, prior to the PPS merger with PG&E in 1954. He was elected a PG&E vice president after the merger.

The new company has established offices in the Natural Gas Building in Calgary. The proposed pipe line initially will deliver 400,000,000 cubic feet of gas daily to the San Francisco Bay area. Covering a 1300 mile distance, the line will originate in the Alberta foothills and follow a route west of Calgary spanning the Canadian Rockies and will traverse portions of Idaho, Washington, Oregon and Northern California, terminating at an existing PG&E station at Antioch. Construction will be started as soon as formal government clearances are obtained in Alberta, Ottawa and the U.S.

•

Ralph H. Starrett will be manager in charge of a **Standard Oil Co.** products Pipe Line division that will be based in Kansas City, Mo. The division headquarters is being transferred from Des Moines, Iowa, where Starrett is in charge.

Other appointments of Pipe Line and Mechanical division superintendents at the company's three division products pipe line offices have been announced. New Pipe Line division superintendents are **Francis W. Mann**, Chicago; **James L. Ashworth**, Kansas City; and **Herbert W. Wilker**, Minneapolis-St. Paul, Minn. All three were formerly district superintendents, with Mann at Council Bluffs, Iowa, Ashworth at Moorhead, Minn., and Wilker at Jackson, Mich.

Mechanical division superintendent assignments went to **Alvis F. Smith**, Chicago; **Hugh Patterson**, Kansas City, and **Virgil J. Hansen**, Twin Cities. They were formerly division master mechanics. Division managers, in addition to Starrett, are **Spencer A. Hallberg**, Chicago, and **Norman F. Tietze**, Twin Cities. Their title was formerly division superintendent.

The transfer of the Iowa office and creation of the two new posts in each division is part of a move to streamline Standard Oil's products pipe line field operations.

•

G. J. Tankersley is the new president and a director of **Western Kentucky Gas Company** and will headquarter in Owensboro, Ky.

G. J. Tankersley

Tankersley was formerly executive vice president and a director of the **Gas Light Company** of Columbus, Ga. He started his career with Gas Light in 1949 as an industrial engineer and progressed to chief engineer in 1953. In 1954 he was elected executive vice president and a year later was elected a director of the company.

•

J. C. Brown is the new chief operator-deliveryman to headquarters at Roseville, Calif., for **Southern Pacific Pipe Lines, Inc.**

Other chief operator-deliverymen appointments in the organization include **T. T. Hendrix** with headquarters at Reno, Nev., **J. G. Sparks** with headquarters at Concord, Calif., and **J. D. Owen** with headquarters at Colfax, Calif. New Assistant chief operator-deliverymen are **L. F. Lee** with headquarters at Concord, Calif., and **J. W. Sims** with headquarters at Phoenix, Ariz.

DEATHS

Claude A. Williams, founder and former president of Transcontinental Gas Pipe Line Corporation, was killed in an automobile collison near Stowell in Chambers County, Texas, on October 17. Williams, who resigned as president of Transco in 1953, was believed to have been on his way from Galveston to his rice farm near Stowell. He founded Transco in 1948 and negotiated the construction of the 1840-mile pipe line from Mercedes, Texas, to New York.

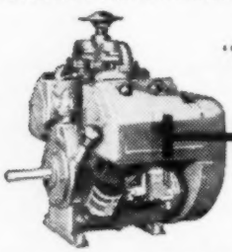
C. A. Williams

THERE CAN BE TROUBLE AT EITHER END UNLESS THE ENGINE IS AIR-COOLED

Air-cooling is the logical method for engine cooling in either extreme heat or cold. It eliminates expensive replacements of cylinder blocks, radiators, water pumps, fans and fan belts beyond human control.

Our heavy duty WISCONSIN air-cooled engines operate under full power load day after day with minimum attention in all temperature extremes . . . the cooling is automatic and trouble-free.

WE HANDLE THE COMPLETE LINE OF WISCONSIN AIR-COOLED ENGINES and PARTS



"NOT ON ORDER . . . BUT ON THE WAY"

HARLEY
SALES COMPANY
WICHITA / TULSA / HOUSTON

WISCONSIN ENGINES AND SERVICE WIDELY AVAILABLE

The biggest mistake is the one you can't see!

As an experienced pipeline man, you'll have little trouble spotting four obvious "errors" in this picture*. But the *biggest* and most *costly* error you can make in pipeline construction is to gamble on unproven or "economy" types of pipeline protection.

Sure, you can buy "protection" that will save you a few first-cost dollars. But wait until you start paying the bills for excessive cathodic protection!

On line after line, in marshlands and mountains, tough, durable *Pitt Chem* Coal Tar Enamels have *proved* their superior ability to resist soil stress and water absorption, the two pitfalls of "economy" coatings. It's the kind of protection that gives you maximum insurance against high maintenance cost.

When you specify *Pitt Chem* you get assured quality, for *Pitt Chem* Coal Tar Enamels are manufactured to rigid, *published* specifications, from highest grade materials.

How can we help you! Send us the details of your coating problem.

*Operating from left side of ditch; man standing on line; man in ditch under line traveling machine; loop in "Hoosier" pole.

PITT CHEM® TAR BASE ENAMELS

- Standard Grade
- Modified Grade
- Plasticized Grade
- Hotline
- Cold Applied Tar Base Coatings

PROTECTIVE COATINGS DIVISION

PITTSBURGH COKE & CHEMICAL CO.

Grant Building • Pittsburgh 19, Pa.

WSW 6587

COAL CHEMICALS • PROTECTIVE COATINGS • PLASTICIZERS • ACTIVATED CARBON • COKE • CEMENT • PIG IRON

PIPE LINE HALF SOLES

SLEEVES

ON THE JOB CONSTRUCTION

CONCRETE RIVER WEIGHTS

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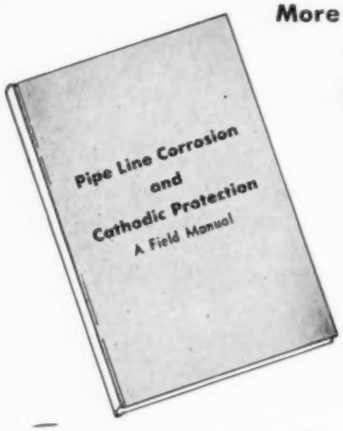
More comments on this new Handbook:

"... a most practical on-the-job manual for men concerned with pipe line corrosion. We are ordering copies for each of our district engineers."



Pipe Line Corrosion and Cathodic Protection

By MARSHALL E. PARKER

This Handbook, written by Marshall E. Parker, consultant, is designed as a practical field manual. It is a 108-page pocket-size volume printed first as a popular series in WORLD OIL. The Handbook is illustrated with many charts and drawings and is completely indexed by subjects.

It presents comprehensive data on Soil Resistivity Surveys, Potential Surveys, Line Currents, Current Requirements, Rectifier Systems, Ground Bed Design, Magnesium Anodes, Stray Current Electrolysis, Interference in Protective Systems, Operations and Maintenance, and Coating Protection and Testing.

An appendix has been added of technical data on Underground Corrosion, Basic Principles of Cathodic Protection, Properties of Metals and Attenuation Equations. Order copies of this practical Field Manual now for each of your field men. Price $3.

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GULF PUBLISHING COMPANY
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WHO'S MEETING WHERE

November

Second International Conference on Nondestructive Testing, Hotel Morrison, Chicago, Nov. 3-8.

Natural Gas Pipe Line Institute, sponsored by University of Kansas and Southwest Kansas Petroleum Industry, Randall's Cafeteria, Liberal, Kansas, Nov. 5-6.

NEGA operating division, Hotel Statler, Hartford, Conn., Nov. 6.

Society of Automotive Engineers national meeting, Statler Hotel, Cleveland, Ohio, with transportation Nov. 4-6; Diesel engineers, Nov. 5-6, fuels and lubricants, Nov. 7-8.

Louisiana Polytechnic Institute, Sixth Annual Instrumentation Conference, Louisiana Polytechnic Institute, Ruston, La., Nov. 7-8.

Instrumentation Conference and Exhibit, Institute of Radio Engineers, Biltmore Hotel, Atlanta, Ga., Nov. 11-13.

API, 37th Annual Meeting, Conrad Hilton Hotel and Palmer House, Chicago, Nov. 11-14, 1957.

National Association of Corrosion Engineers, Fall Meeting of Northeast Region, Penn-Sheraton Hotel, Pittsburgh, Nov. 12-14.

National Association of Corrosion Engineers, Miami Short Course, Key Biscayne, Fla., Nov. 13-16.

ASA Eighth Conference on Standards and 39th annual meeting, San Francisco, Calif., Nov. 13-15.

Natural Gasoline Association of America, Panhandle Plains Regional, Herring Hotel, Amarillo, Texas, Nov. 22.

December

American Society of Mechanical Engineers, Annual Meeting, Statler Hotel, New York City, Dec. 1-6.

API Oil Information Committee meeting, Biltmore Hotel, New York City, Dec. 5-6.

Third Biennial Short Course on Cathodic Protection, University of Illinois and NACE, Urbana, Ill., Dec. 9-13.

January

Tenth Annual Pipe Line Contractors Association Convention, Boca Raton Hotel and Club, Boca Raton, Fla., Jan. 19-22.

NACE Houston section short course, University of Houston, Houston, Texas, Jan. 23-24.

Seventh Annual Instrument Short Course, co-sponsored by Southern California Meter Association and the Los Angeles Harbor Junior College, Jan. 30-31.

February

National Association of Corrosion Engineers, short course for pipe liners, Mayo Hotel, Tulsa, Okla., Feb. 12-14.

Pipe Line Contractors Association of Canada, Fourth Annual Convention, Empress Hotel, Victoria, B. C., Feb. 20-22.

Natural Gasoline Association of America, Permian basin regional meeting, Lincoln Hotel, Odessa, Texas, Feb. 28.

HD-11 side boom tractor owned by Hood Construction Company, Lynwood, California, is laying pipe for gathering line in Signal Hill Field, Long Beach, California. Front-mounted power take-off permits side boom to work independently of tractor engine clutch. Back of tractor is free for winch or other rear-mounted equipment.

HD-11 Tractor-Side Boom Meets Oil Field Specs

right down the line

Users have found the Allis-Chalmers 94-belt-hp, HD-11 crawler tractor with Tractomotive side boom exactly right for oil field pipe handling work.

It's Oil Field Strong

40,200-lb lifting capacity gives you all the power you need to put in gathering lines . . . set valves, "Christmas trees," pumping equipment . . . maintain, repair, and replace existing oil lines.

It's Oil Field Trim

34,134-lb total weight of tractor, boom, and full counterweight gives you a tractor for all jobs on the medium-size lines, and many jobs on the big lines. Over-all size, weight, and pin connections, make it easy to transport side boom.

It's Oil Field Tough

Heavy-duty construction, high clearance, and good flotation let the HD-11 handle jobs under the toughest conditions — through swamp and muck, up steep grades, in rocky terrain. And there's no babying this tractor with daily greasing — Allis-Chalmers truck wheels, idlers, and support rollers need lubrication only once each 1,000 hours of operation.

It's Oil Field Safe

Internal expanding brakes provide positive side boom control — are fully enclosed from dirt and moisture. Drop-proof, safety-link counterweights are hydraulically controlled, and mounted high for extra clearance. Over-all balance gives you stability even when booming big loads way out.

Find out all the reasons why this tractor-side boom team is right on every count for oil field pipe handling work. See your Allis-Chalmers-Tractomotive dealer for the full story.

ALLIS-CHALMERS, CONSTRUCTION MACHINERY DIVISION, MILWAUKEE 1, WISCONSIN
TRACTOMOTIVE CORPORATION, DEERFIELD, ILLINOIS.

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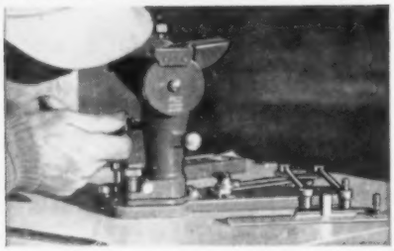

For great savings of man-hours in the field. Highest precision results in shortest possible time.

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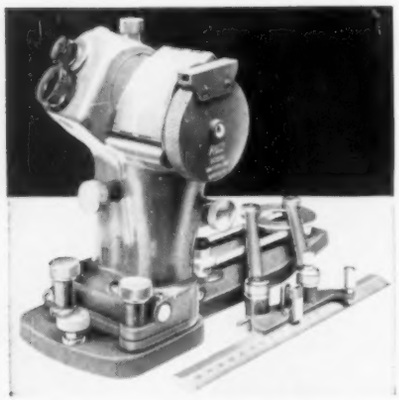

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What's Happening among SERVICE and SUPPLY MEN

N. T. Shideler

A. E. Gray

Shideler, Gray Take Positions In Pittsburgh's Expanded Division

Pittsburgh Coke and Chemical Company has promoted two executives to head activities of its expanded Protective Coatings division. Norman T. Shideler was elected president of Insul-Mastic, Inc., a newly acquired subsidiary producing for the Protective Coatings division, and Arthur E. Gray was named to succeed Shideler as the division's general manager.

Shideler will also act as technical adviser to the vice president of chemical divisions with regard to industrial coatings and tar products of Pittsburgh Coke. He will be responsible for coatings research and development for the subsidiary. He joined the company in 1948 as chief of production research and development.

Gray, a member of the company since 1952, was vice president and sales manager of Pipe Protection Service before joining Pittsburgh Coke as the assistant manager of Protective Coatings division.

McCormick New Vice-President Of International Harvester

The International Harvester Company board of directors recently elected Brooks McCormick executive vice president succeeding Christian E. Jarchow who is retiring after 43 years of service.

McCormick joined the firm in 1940 and has worked as salesman, assistant and general superintendent, assistant manager of sales, and joint managing director of the company's Great Britain, Ltd., office. In 1952 he was elected managing director of the British subsidiary company and served in that capacity until 1954 when he returned to the U.S. to become director of the manufacturing of the parent company.

New W-K-M Foundry To Cover 78 Acre Site

Now under construction on a 78-acre site in Richmond, Texas, the new W-K-M Foundry will produce approximately 600 tons of steel castings and 400 tons of grey iron castings per month.

General contractor for the project is J. Emil Anderson of Chicago. It is a continuation of the arrangement with the Anderson firm which constructed W-K-M's new facility at Missouri City, Texas, last year.

U. S. Steel Appoints Hunnicut Representative at Denver City

Jackie R. Hunnicut is the new field representative at U.S. Steel Oil Well Supply Division at Denver City, Texas.

Hunnicut was employed by "Oilwell" in 1955 at Denver City.

Alan Wood Steel Division Opens New Fabricating Plant

The Penco Metal Products division of Alan Wood Steel Company recently started the manufacture of steel storage equipment at its new $2,500,000 metal fabricating plant at Oaks, Penn.

The plant contains 156,000 square feet of floor area and is air-conditioned throughout.

Kaiser Steel Corp. Elects Cooper Purchasing Agent

Frank E. Cooper is the new purchasing agent of the Montebello Fabricating Division of Kaiser Steel Corp., succeeding Jerry P. Anderson who has joined the company's engineering sales staff.

Cooper has handled administrative work in purchasing since affiliating with Kaiser in 1955.

Jones & Laughlin Division Moves to New Site in Casper

New site for Jones and Laughlin Supply Division oil field supply store in Casper, Wyo., is at 707 East F. Street, Access Road South. The new prefabricated structural steel building is 5600 foot square and houses a storeroom, warehouse, store office, three sales offices and a pump shop.

Henry Franke, who has been with Jones and Laughlin since 1950, will serve as manager of the division.

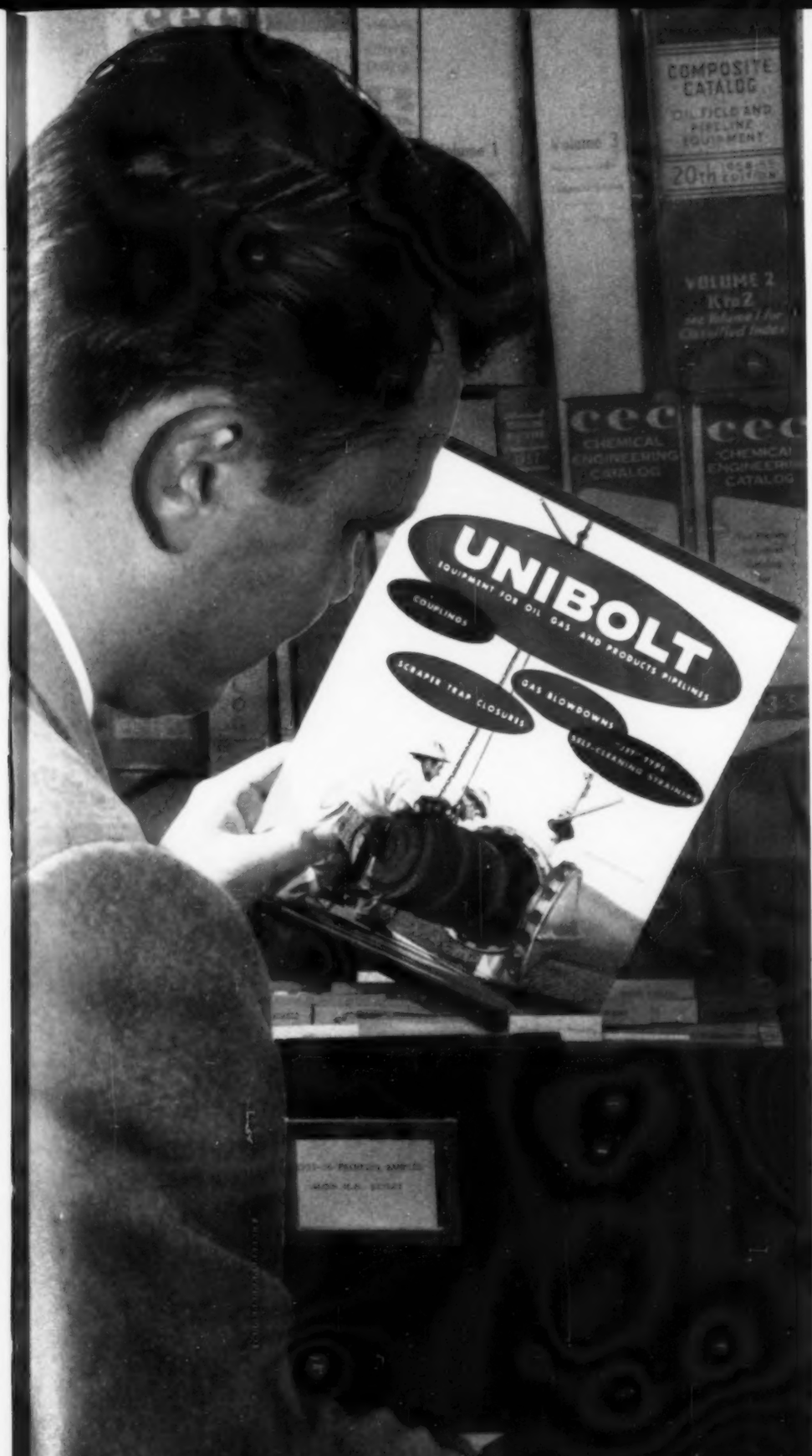
Mallina Joins Gardner-Denver As Research Consultant in Mich.

R. F. Mallina, inventor and authority on the solderless wrap connection, recently joined the Gardner-Denver Company as a research consultant.

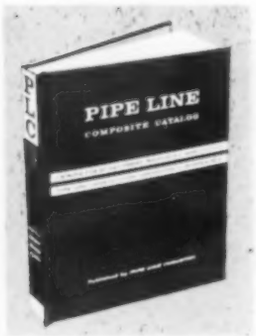
R. F. Mallina

He will work with the company's Keller Tool Division that has plants at Grand Haven and Reed City, Mich. Mallina comes to Gardner-Denver after retiring from Bell Telephone Laboratories, Inc., where he served for 28 years, most recently as head of the mechanical development group of the switching apparatus development department.

The Keller Tool Division of Gardner-Denver manufactures air tools and hoists for industry.



Complete specifications on UNIBOLT Couplings, Scraper Traps, and Jet Strainers filed for your convenience in Pipe Line Composite Catalog



A separate reprint of the UNIBOLT Pipe Line Catalog will be sent gladly upon request.

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The well dressed pipeline...

Fibreglass reinforced tissue pipewrap is designed for use with asphaltic or coal-tar enamels. It will withstand immersion under load in hot enamel at over 500 degrees Fahrenheit and remain substantially unaffected in strength.

Fibreglass pipewrap has high porosity which gives even and immediate bleed through of enamel. Nevertheless this porosity is combined with high tear and tensile strength. Field experience has shown that breaks and tears are negligible. Enamels reinforced with Fibreglass give maximum resistance to corrosion, soil stress and backfill damage.

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Worthington Corporation Elects Meiter to New Vice Presidency

Worthington Corporation announced today the election of William A. Meiter to the newly created post of vice president of employe relations and organization development.

W. A. Meiter

Meiter, formerly general marketing manager, has been associated with Worthington since 1927. He will be succeeded as general marketing manager by A. William Fraser, commercial vice president in charge of the district sales offices at Chicago, Denver, Kansas City, St. Louis and Minneapolis.

Fischer & Porter Company Names Three Regional Managers

Fischer & Porter Company has named managers for its newly organized eastern, southeastern and southwestern sales regions.

Harold Russell has been named manager of the Eastern region, comprising the New York, Philadelphia, Boston, Baltimore-Washington, Richmond and Albany-Syracuse offices. Russell was formerly sales engineer for major industrial accounts.

William Trethaway will manage F&P's southeastern area, to include the Atlanta, Birmingham and Knoxville offices as well as the two offices in Florida at Clearwater and Jacksonville. Trethaway joined Fischer & Porter in 1951.

Glen Dorflinger will manage the Southwestern region which includes offices in El Paso, Dallas, Houston and New Orleans. Dorflinger was formerly manager of the Houston office.

New Orleans Office, Warehouse Opened By Clark Brothers Company

Clark Brothers Company has announced the opening of a new office and warehouse facilities at 800 Central Expressway, New Orleans. Clark Brothers, a division of Dresser Industries, Inc., are manufacturers of compressors and gas turbines for the petroleum, chemical and general industries. John Cooper is the New Orleans branch manager.

Aldrich Pump Company Gets Michigan Sales Representative

The Aldrich Pump Co. has announced the appointment of the DuBois-Webb Co. as exclusive sales representative for the company's products in the southern peninsula of Michigan.

Youngstown Sheet and Tube Announces 2 New Appointments

Fred E. Theis and Norman P. Hitchcock are new superintendents at Indiana Harbor Works of the Youngstown Sheet and Tube Co.

Theis is the new superintendent of shops. He has been with the Youngstown firm since 1937. At the time of his promotion he was shop planning engineer at the Campbell Works.

Hitchcock, new superintendent of maintenance and power, joined the company in 1933 and has served in supervisory positions including chief electrical inspector, general foreman and assistant superintendent of maintenance.

Bennett Pump's KC Office Moves to Larger Quarters

The Kansas City district office of Bennett Pump Division, John Wood Company has moved to new quarters at 214 West 39th Street, Kansas City 11, Mo. The company's Kansas City warehouse will remain in its present location. R. W. Lane is Kansas City district manager.

Porter Names Counselman Industrial Sales Manager

E. G. Counselman, Washington representative, H. K. Porter Company, Inc., has been appointed manager of industrial sales with headquarters in New York. William E. Haines, director of industrial defense, Department of Commerce, has been named Washington representative to succeed Counselman.

A. O. Smith Corporation Names Joyce, Thomas for Sales

New sales representatives for A. O. Smith Corporation's Welding Products division are Fred J. Joyce and John P. Thomas.

Joyce, formerly with Metal & Thermit Co., will operate in the Oakland, Calif., area. Previously with Eutectic Welding Alloys, Inc., Thomas will headquarter in Atlanta.

Medlin Will Supervise IH's Newly Created Department

Abel A. Medlin, formerly with International Harvester Company for 16 years, has returned to that firm after four years with Dodge Division, Chrysler Corporation. Medlin will serve as supervisor of the newly created used equipment merchandising department of that division.

PIPELINES are NOT SIDELINES
WILLIAMS BROTHERS
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NBT BLDG. • TULSA, OKLAHOMA • CABLE ADDRESS: WILLBROS
New York • Washington • Louisville • Minneapolis • New Orleans
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OIL • GAS • WATER • PRODUCTS PIPELINES • PUMPING STATIONS

For more data on advertised products, use Readers' Service Cards, last page.

English Firm to Produce Remote Control Equipment

Whessoe Ltd. of Darlington, England, producer of steel storage tanks and refinery equipment, has been appointed manufacturing licensee for Shand and Jurs Company's new line of electrical remote control and supervisory equipment for the handling of flammable liquids in the petroleum, chemical and processing industries

Bucyrus-Erie Names Distributor For Nevada-California Territory

Sanford Tractor & Equipment Company, Reno, Nev., has been appointed a distributor for Bucyrus-Erie Co., in western and central Nevada and in northeastern California.

Enardo Transfers Heller To Canadian Sales Office

Bruce Heller, sales representative of Enardo Manufacturing Co., Tulsa, has been transferred from Carmi, Ill., to Regina, Saskatchewan, Canada. Enardo has a sales office and warehouse in Edmonton and the company plans to open other Canadian branches soon.

W-K-M Appoints Barney Doak Canadian Sales Manager

The appointment of Barney R. Doak as manager of Canadian sales and service for W-K-M, division of ACF Industries, Incorporated, has been announced. Doak, who was formerly with Parkersburg Rig and Reel Company, will have his headquarters in Calgary.

Jones & Laughlin Appoint Successor to Fred Goodwin

Fred E. Goodwin, payroll section supervisor of Jones & Laughlin Supply Division has retired after 37 years and 11 months of service. Clyde E. Fleming, inventory analysis clerk, has been appointed successor to Goodwin.

F. E. Goodwin

J. W. Crownover, Jr., formerly store manager at Drayton Valley, Alberta, Canada, has been transferred to Edmonton, Alberta, Canada, to serve as store manager. William J. Chisholm, formerly a sales representative at Drayton Valley, Alberta, Canada, has been assigned to serve as store manager at that location.

Carl J. Bates, sales at Jones & Laughlin Supply Division, has been transferred from Great Bend, Kansas, to Borger, Texas.

Palmer Is New District Manager Of Chicago Garlock Packing Co.

A veteran of 30 years service with the Garlock Packing Co., Charles F. Palmer, Jr., is the new district manager of the firm's Chicago branch at 600 West Jackson Blvd.

Palmer has been district manager at Philadelphia, Pa., for a number of years and succeeds Harry J. Ramshaw who is retiring after nearly 50 years of service, the last 32 years as district manager at Chicago.

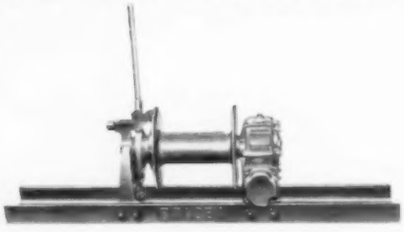
American Natural Gas Service Announces New Houston Office

The American Natural Gas Service Company has announced the new location of its Houston office at Adams Petroleum Center, Houston 25, Texas.

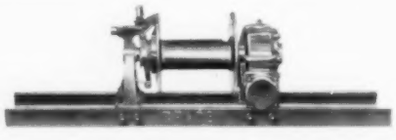
BRADEN TRUCK WINCHES

announcing 6 NEW BRADEN TRUCK WINCHES

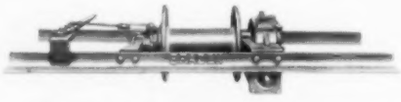
1 AND 2 MODELS
MS3-7and MS3-10



3 AND 4 MODELS
MS3-7A and MS3-10A



5 AND 6 MODELS
MSU3-10 and MSU3-10F



The tested basic design of the popular regular MS Series is used in these new winches. However, new engineering, metallurgical refinements, stronger keys and drum shaft, plus thicker base angles increase ratings to 8,000 lbs. capacities. Winches for back-of-cab or underslung models are available in this new series.

See Your Braden Dealer or Write . . .

BRADEN WINCH COMPANY
P. O. Box 547, Broken Arrow, Oklahoma

BRADEN Winches

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"IN SERVICE AROUND THE WORLD"

STATEMENT REQUIRED BY THE ACT OF AUGUST 24, 1912, AS AMENDED BY THE ACTS OF MARCH 3, 1933, and JULY 2, 1946 (Title 39, United States Code, Section 233) SHOWING THE OWNERSHIP, MANAGEMENT, AND CIRCULATION OF PIPE LINE INDUSTRY, published monthly at Houston, Texas, for October, 1957.

1. The names and addresses of the publisher, editor, managing editor, and business managers are: Publisher, Ray L. Dudley, 3371 Chevy Chase, Houston, Texas; Editorial Director, Warren L. Baker, 5324 Cherokee, Houston, Texas, Editor, Melvin A. Judah, 3311 Sackett, Houston, Texas; Managing Editor, Wallace Fitzgerald, 1514 Hewitt Drive, Houston, Texas; Business Manager, Robert M. de Sombre, 4410 Ingersoll, Houston, Texas.

2. The owner is: The Gulf Publishing Company, Houston, Texas; June Wooden Bliss, Houston, Texas; June Wooden Dudley Bliss—Trustee, Houston, Texas; Mrs. Grace C. Carter, Dallas, Texas; Mrs. Margaret D. Cashman, Beaumont, Texas; Drum & Company, c/o Trust Department, Houston, Texas; P. Stilson Dudley, Eldorado, Texas., Ray L. Dudley, Houston, Texas; William G. Dudley, Houston, Texas; William V. Gross, Alpine, Texas; Mrs. Carolyn Dodson Keeble, Abilene, Texas; Mrs. Anita S. Lane, Houston, Texas; Charles H. Lane, Houston, Texas; James William Nelson, Baytown, Texas; Tom W. Nelson, Houston, Texas; Mrs. Sallie Windham Ridley, Houston, Texas; Walter Gage Sterling—Trustee, Houston, Texas; O. R. Waller, Chicago, Illinois.

3. The known bondholders, mortgagees, and other security holders owning or holding 1 percent or more of total amount of bonds, mortgages, or other securities are: NONE.

4. Paragraphs 2 and 3 include, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting; also the statements in the two paragraphs show the affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner.

5. The average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the 12 months preceding the date shown above was: (This information is required from daily, weekly, semiweekly, and triweekly newspapers only.)

R. M. de SOMBRE
Business Manager

Sworn to and subscribed before me this 18th day of September, 1957.

P. J. AUCOIN
(Seal) Notary Public in and for Harris County, Texas.
(My commission expires June 1, 1959.)

FOR DEPENDABLE GATHERING AND DELIVERY OF OIL AND GAS...
ELECTRIC WELD LINE PIPE* from

Acme-Newport

***SIZES AND WEIGHTS AVAILABLE**

O.D.	Wall	Wt. Per Ft.
4½	.125"	5.84
	.142"	6.61
	.156"	7.25
	.188"	8.64
	.219"	10.00
	.237"	10.79
6⅝	.134"	9.29
	.156"	10.78
	.188"	12.89
	.219"	14.97
	.250"	17.02
	.280"	18.97

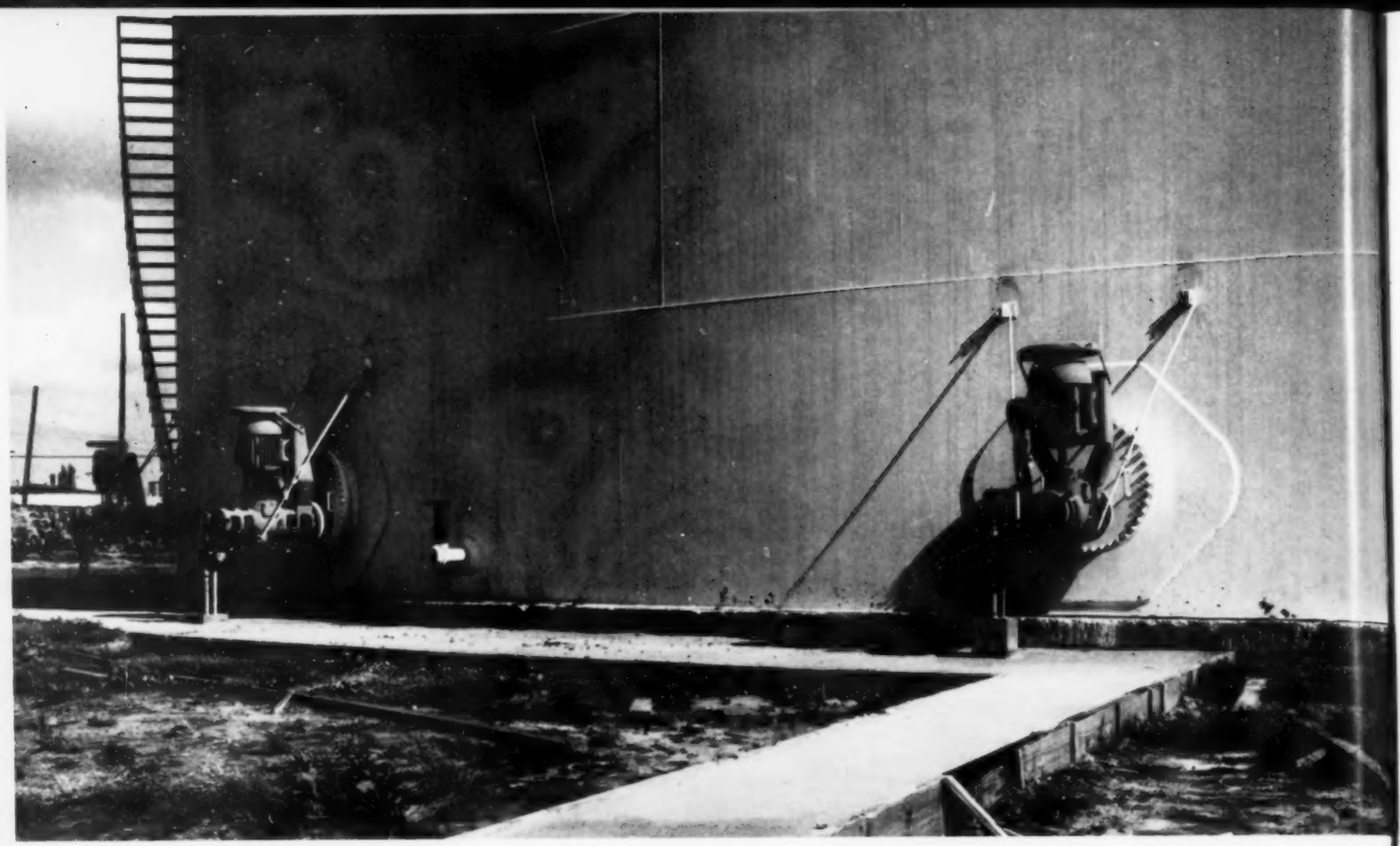
The excellent performance of Acme-Newport line pipe under high pressures is the heritage of fine electric furnace steels, quality controlled through every process, formed to perfect roundness and wall thickness, and hydrostatically tested. This 4" and 6" pipe lines up properly, bends and welds easily, saves time on the job.

It surpasses all requirements of API and ASTM. More important, it proves itself continuously in the field. Before you buy more line pipe, talk with Acme-Newport.

ECONOMICAL WATERAIL-TRUCK DELIVERY

This Company is ideally situated on the Mississippi-Ohio River system and the great Cincinnati rail-truck hub. New barge facilities, 7 major railroads and 143 motor carriers enable Acme-Newport to give economical, dependable delivery to the entire area of the Middle West and South.

Acme-Newport Steel COMPANY
NEWPORT, KENTUCKY
A SUBSIDIARY OF ACME STEEL COMPANY



You save $1000 per tank per year

when you keep bottoms clean by pressing a button

Take a minute to add up what it costs you to clean out the sediment in an 80,000-barrel crude storage tank.

The answer—5000 to 8000 dollars—may amaze you. Yet these figures are based on careful field studies by a major pipeline company.

Your total cost includes:

- what you pay for cleaning
- your overhead while the tank is out of service
- value of refinable oil and wax you lose in the bottoms (at least $2000—and sometimes as high as $6000).

Fortunately, this is one expense you don't have to accept. Prevention is easy. Put LIGHTNIN Mixers on your tanks, and start enjoying savings *on the order of $1000 per 80,000-barrel tank per year.* Savings on larger tanks are equally spectacular.

No need to scrape out sludge

You eliminate sludge buildup—for good—when you install LIGHTNIN Mixers. By pressing a switch button, you start the tank contents in gentle motion that keeps sediment suspended in the crude, or resuspends any that has settled. You can keep bottom sediment level, year to year, as low as *one inch.*

You dispatch a more uniform crude when you use LIGHTNINs in your tanks. Crude leaving the tank has the same values as when it entered the tank. You overcome the risk of large slugs of accumulated sediment breaking loose and moving into the pipeline.

By eliminating downtime for sludge cleanout, you keep your tank farm's *full holding capacity* ready for use when you need it. You gain as much as 12% more storage capacity—without adding a single tank.

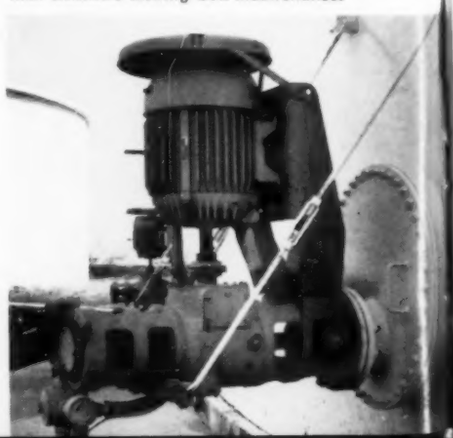
Do this today

More than 50 independent pipeline companies and about 35 leading producers and refiners are cutting crude storage costs this effortless LIGHTNIN way. So can you! To see how, just call in your LIGHTNIN Mixer representative (listed in Pipeline Composite Catalog). Or write us direct.

Lightnin® Mixers

MIXCO fluid mixing specialists

LOW OPERATING COST. It takes as little as one hour to suspend sediment in a full tank. Upkeep is simple; choice of stuffing boxes to meet your conditions, or mechanical seals that eliminate stuffing-box maintenance.



Get these helpful bulletins on BS&W control and LIGHTNIN Mixers. Check, tear out and mail to us today with your name and company address. Free—no obligation.

- ☐ BS&W Control with LIGHTNIN Mixers (B-503)
- ☐ Side entering mixers, 1 to 25 HP (B-104)
- ☐ Data sheet for figuring mixer requirements (B-107)
- ☐ Condensed catalog describing LIGHTNIN Mixers—all types (B-109)
- ☐ LIGHTNIN rotary mechanical seals for extra-low-cost mixing (B-111)

MIXING EQUIPMENT Co., Inc., 196-m Mt. Read Blvd., Rochester 11, N.Y.

In Canada: Greey Mixing Equipment, Ltd., 100 Miranda Avenue, Toronto 10, Ont.

What's New in EQUIPMENT

Utility Buildings

A new all-steel pole-type building line called Stran-Master is offered by Stran-Steel Corporation, a unit of National Steel Corporation. The industrial utility units feature cost as low as 70 cents per square foot, do-it-yourself construction, and adjustable columns and girts for easy plumb and squaring.

Offering industry fire-safe warehousing, the Stran-Master provides low price structural package which can be used for light manufacturing, automotive storage, retail stores, and executive parking. The flexible building comes in a range of sizes, from widths of 12 feet to 120 feet and in length to any multiple of 16 feet. Windows and doors can be placed anywhere. It can be ordered with any or all walls open.

Steel wall roof panels are of a modern ribbed design. The panels are 3 feet wide and run eave-to-ground in length, resulting in minimum labor in erection and fewer joints and laps—assuring weather-tight construction and low maintenance costs. It's a low-profile building and has a peak roof with a pitch of 2 feet in every 12 feet.

No cranes or heavy equipment are needed for erection. A 36 feet by 72 feet Stran-Master can be put up by an unskilled maintenance crew in 180 to 200 man hours. There are no nails or spikes to be driven: all framing connections are made through factory-drilled holes by bolting.

For more data, circle **No. E1** on Readers' Service Card, last page this issue.

Fan and Limit Switch

A new fan and limit switch that is 50 percent smaller than previous models has been developed by the General Electric Company's Appliance Control department for gas or oil fired domestic heating systems.

Combined in one enclosure are the necessary components to control the fan or blower operation and also act as a safety limit control. Simple in design, the device is of one-piece construction. Two separate control units mounted in the same enclosure give a wide, fast, and accurate response.

(This item supplements General Electric Company data on Pages 181-188 of the Composite Catalog, 1st Edition).

For more data, circle **No. E2** on Readers' Service Card, last page this issue.

Fire Extinguisher

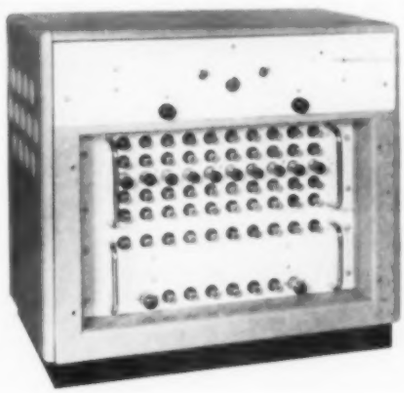
Two new pressurized dry chemical portable fire extinguishers have been announced by Walter Kidde and Company of Belleville, N. J. The new streamlined models come in 20 and 30 pound capacities and were designed by Kidde engineers working closely with Henry Dreyfuss personnel.

For more data, circle **No. E3** on Readers' Service Card, last page this issue.

Telephone Exchange

A new electronic telephone exchange for commercial use has been announced by Pye Telecommunications, Limited of Cambridge, England.

The instrument possesses no moving parts or sparking contacts and requires no skilled mechanical maintenance. It is 20½ inches long, 19 inches high and 12 inches deep and has just over 1000

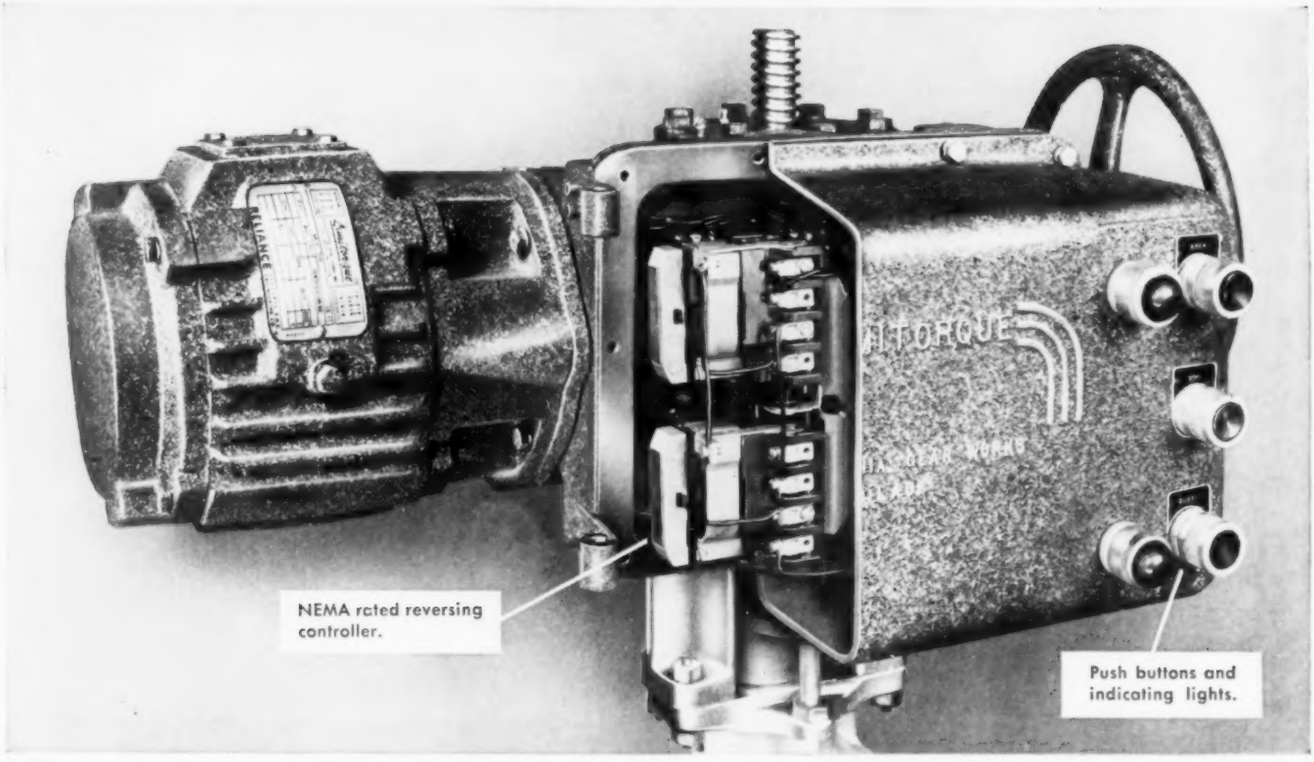


components including 74 valves which eliminate the need for moving switches.

The exchange has a memory and holds a call until the number becomes disengaged and then puts the call through.

(This item supplements Pye Telecommunications Ltd. data on Pages 336-337 of the Pipe Line Composite Catalog, 1st Edition).

For more data, circle **No. E4** on Readers' Service Card, last page this issue.



Reduce Installation, Equipment Costs 50%

LimiTorque Value Operators feature fully integral controls for quicker, easier installation, operation

LimiTorque is first again! LimiTorque valve operators now feature integral NEMA rated reversing controllers, push button and indicating light elements. You can actually reduce the installation and component equipment costs up to 50%.

Various combinations of control items can be included in the same switch compartment. Why use costly separate control components when they are obtainable completely wired in your LimiTorque.

To compensate for temperature ranges, overloads are adjustable from 85% to 115% of the heater rating, thereby eliminating stocking of replacement heaters.

Push button elements, selector switches, etc., when required, are mounted in the hinged cover for quick, easy accessibility to all control components. LimiTorque can be field mounted on your existing valves. Contact your valve manufacturer or closest LimiTorque sales engineering office.

Remember, today's trend is toward low cost simplicity. LimiTorque operators with integral controls are designed with this in mind. Write today for Bulletin 6-57.

Minimize use of these costly components!

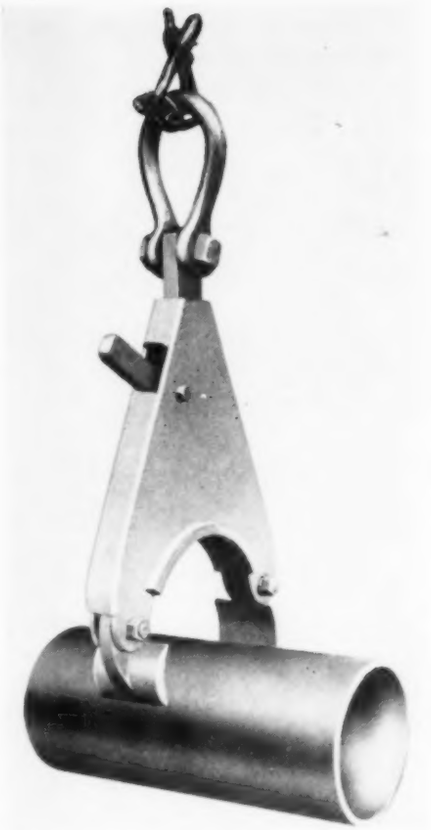
- Separate push button and control stations
- Separate reversing controllers
- Control racks
- Conduit runs, condulets
- Enclosures, wiring
- Labor required for above items

LimiTorque®

PHILADELPHIA GEAR WORKS, INC.
ERIE AVE. & G STREET, PHILADELPHIA 34, PENNA.
Offices in all Principal Cities

INDUSTRIAL GEARS & SPEED REDUCERS • LIMITORQUE VALVE CONTROLS • FLUID MIXERS • FLEXIBLE COUPLINGS

Limitorque Corporation • Philadelphia



Pipe Tongs

The C. A. Mathey Machine Works, Inc., of Tulsa has announced their new Mathey pipe tongs featuring automatic release when weight is slacked off.

The tongs do not require manual attention when they are released. They are available in a complete range of standard pipe sizes from four to 36 inches.

(This item supplements C. A. Mathey Machine Works, Inc., data on Pages 248-285 of the Pipe Line Composite, 1st Edition).

For more data, circle **No. E5** on Readers' Service Card, last page this issue.

Oil Field Trailer

Production of the new "808 oil field float"—a lightweight heavy-duty oil field trailer, is announced by Spencer-Safford Loadcraft, Inc. of Augusta, Kansas.

The new trailer weighs less than conventional trailers, yet it is rated for as much as five tons more payload.

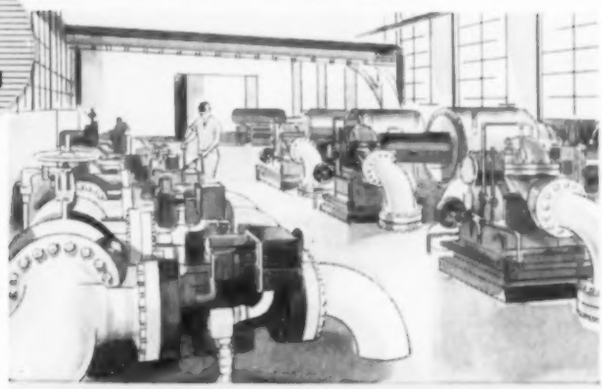
The favorable weight-strength ratio has been achieved through the use of special formula 808 steel with a nine-inch outer rail and a frame fully 18 inches deep. The trailer weighs 9600 pounds, more than a ton less than conventional makes.

For more data, circle **No. E6** on Readers' Service Card, last page this issue.

A Solution to Pipeliner Problems

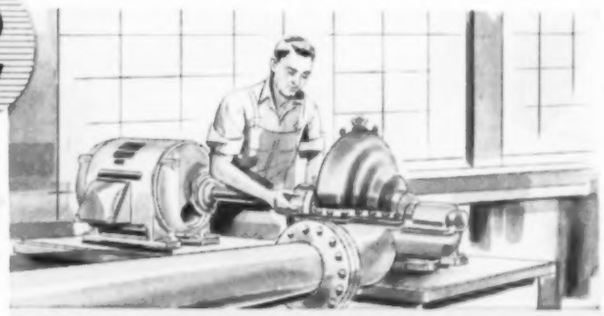
8-B SHAFT SEAL

1 ON HIGH PRESSURES



Specially engineered hydraulically balanced construction permits handling of all pressures encountered in modern pipe lines. Pipeliners report that 8-B Seals in continuous main line pump service for more than 44,000 hours are still in perfect working condition.

2 ON MAINTENANCE MAN-HOURS

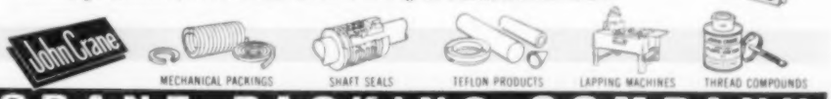


8-B Seals are quickly installed. Removal of the top casing on split case pumps is not necessary. Simply slide the entire unit along the shaft into position. Once installed, little or no attention is required. Service-life is long. No messy leakage.

The 8-B Seal is available in a full range of shaft sizes for every main line or tank farm pump service.

For general information request Bulletin S-215-1. Give mechanical specifications and service details for specific recommendations.

Crane Packing Co., 6434 Oakton Street, Morton Grove, Illinois. (Chicago Suburb) *In Canada Crane Packing Co., Ltd., Hamilton, Ont.*



CRANE PACKING COMPANY

How bonus-powered

International Superior

"FILL THE SHOES"

of bigger competitive rigs...

for Horizontal Holes, Inc., Houston, Texas

First and foremost, Horizontal Holes, Inc., requires large lifting and pipe-handling capacity from their sidebooms. They demand ease of transport, to expedite frequent equipment "moves" per day. They insist on operating ease and safety; positive balance; soft-ground flotation; mud-clearing weight hinges.

That's why Horizontal Holes, Inc., standardize on International Superior TD-18 and TD-14 sidebooms. They freely state, for example, that the TD-18 booms "fill the shoes" of higher power-rated, more costly units on their work.

One Horizontal Holes spokesman states: "The new TD-18 sideboom handles practically as many pipe sections as a bigger, special offset track model competitor." Supt. J. M. Laney declares: "We are buying all International sideboom equipment. The TD-18 unit can lift and carry a 117-foot length of 34-inch casing, with the auger inside. Bigger crawlers can't do much better."

See the decisive extra measure of pipelaying power and profit-making performance your equipment dollar will buy—in any International Superior sideboom size. Try the reach-easy, work-easy control levers—size-up the maintenance ease of these outfits. Prove flotation, balance, and mud-clearance on the job. See your International Superior Distributor for a sideboom demonstration.

After helping assemble the boring unit, this International Superior TD-14 sideboom carries it to position—holds and guides it into trench for boring crossings—such as under roads, railroads, and other barriers. The job: boring a 60-foot road crossing, on conversion of a Texas Eastern gas line into a products line in Indiana. Note that the boring machines are powered by International U-281 power units.

Sidebooms

Cradling the Crosse boring machine, and an 88-foot section of 20-inch casing, this International Superior TD-14 sideboom helps speed the hole being bored. This spread owned by Horizontal Holes, Inc., is putting Texas-Eastern gas line under C & E I tracks near Beecher, Illinois. "This new boom 'has it over' any other machine I've operated," says the operator!

Under Wisconsin Highway 11, near Waterford, goes a 34-inch hole, 65 feet long—in only 45 minutes! A new International Superior TD-18 sideboom is cradling the Crosse boring machine. With 41 bores to make on 20 miles of line, big boom capacity and ease of transport are vital to Horizontal Holes, Inc.

INTERNATIONAL HARVESTER

INTERNATIONAL®
SUPERIOR

PROVEN DRAGSHOVEL PERFORMANCE
Now in Popular New Size

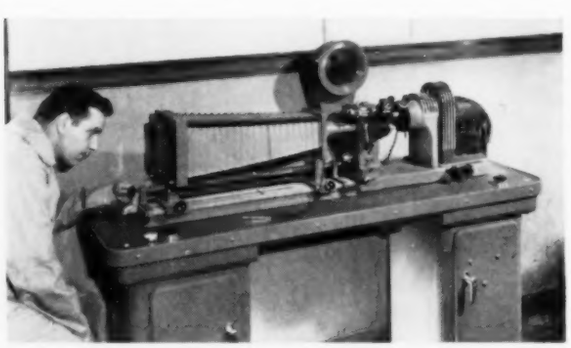
BUCYRUS ERIE

1-yd. 30-B

The outstanding performance of the Bucyrus-Erie 15-B and 22-B dragshovels on pipeline construction now is available in the 1-yard class with introduction of the new 30-B.

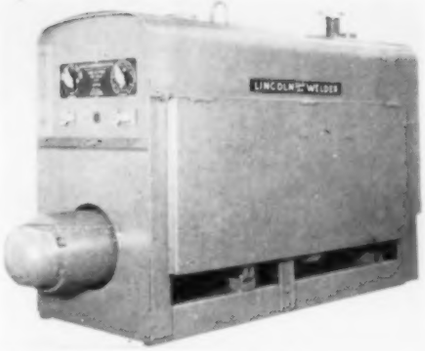
The 30-B is available with either diesel or gasoline power, direct or torque converter drive. It features easy air controls; strong, rigid cast-steel revolving frame; large, cool-running clutches and brakes; and optional independent propel. Three widths of trench dippers are available. Side cutters are available for the trench type dippers as extra equipment to give additional cutting widths. Dippers have cast lips fitted with two part teeth. Especially useful to pipeliners whose work often puts them on very rough terrain is a telescopic strut between the auxiliary A-frame and the cab which serves as a safety against kick-back when working on steep grades.

Your nearby Bucyrus-Erie distributor will be pleased to give you all the details on this new 1-yd. 30-B dragshovel. Contact him soon.



Bonus Quality—The texture and physical makeup of all metals used in Bucyrus-Erie equipment is an important determinant of their strength and durability. Here a metallographic microscope is being used to check the structure of a sample of metal and photograph it to provide a permanent record. 383E57

BUCYRUS-ERIE COMPANY
SOUTH MILWAUKEE, WISCONSIN



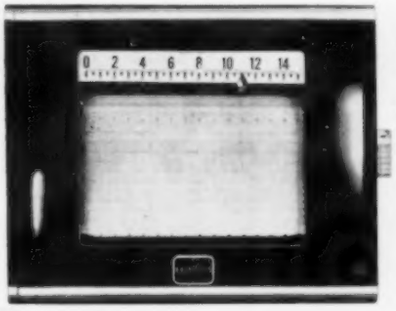
Engine-Driven Welder

The Lincoln Electric Company of Cleveland, Ohio, announces a new model of its 6090, 200 ampere, gasoline engine-driven portable arc welder.

The new welder, called the K-6090, is NEMA rated 200 amperes at 40 volts and 60 percent duty cycle, has dual controls for the generator output, an electrical outlet providing one kw of auxiliary DC power, an idling device and is powered by a 36 horsepower water-cooled engine.

Controls on the new Model K-6090 include a five-step selective current control and a continuous voltage control which also provides fine adjustments in the current. The ranges of the steps on the selective current control overlap, so that it is possible to obtain either a high or a low open circuit voltage for any current, thereby selecting the type of arc most appropriate for the work. The auxiliary power is 115 volt, DC, which may be used for power tools or lighting. Welding controls, auxiliary power outlet and wing-nut output terminals for the welding cable are externally mounted and readily accessible.

For more data, circle **No. E7** on Readers' Service Card, last page this issue.



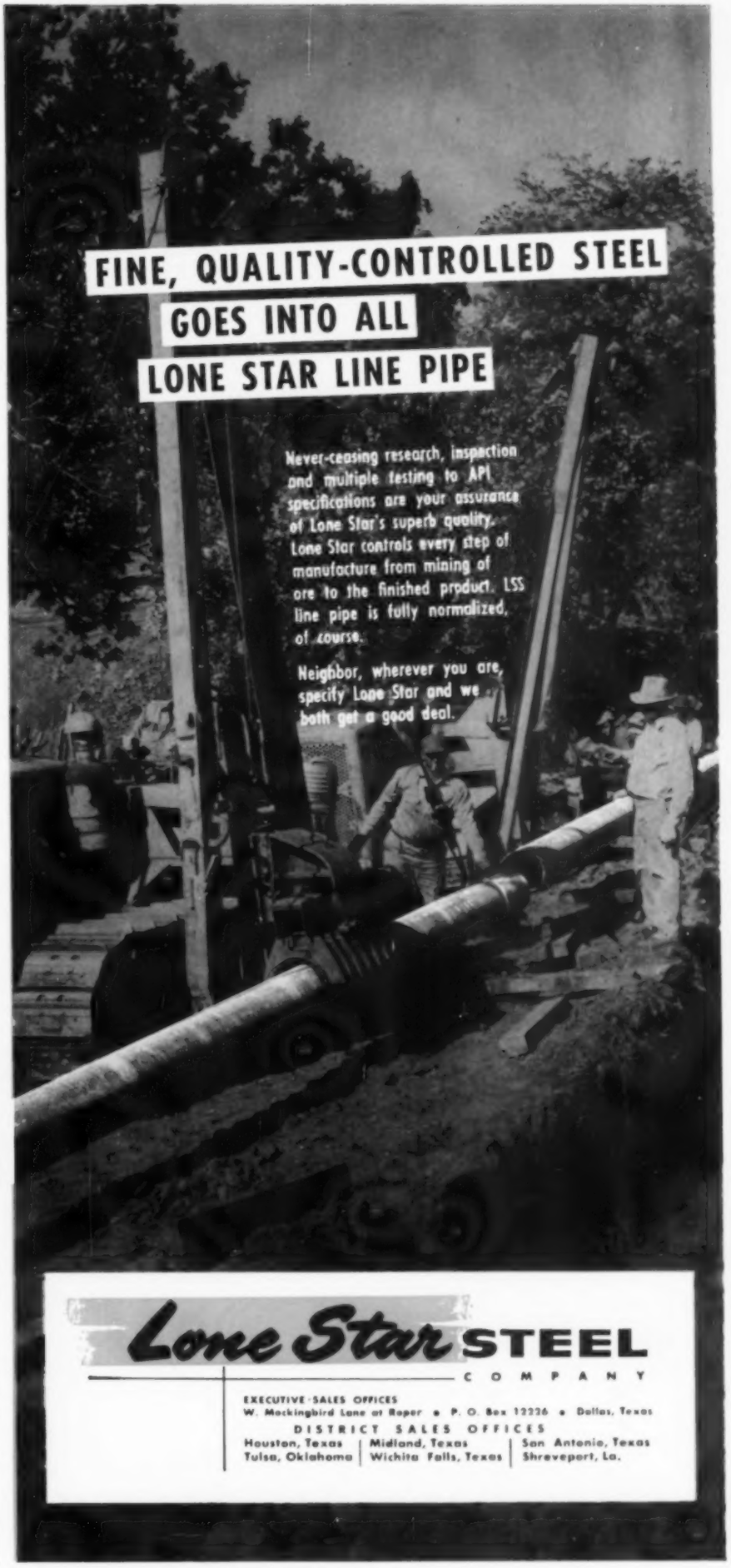
Recorder

A new Electronic Dynamaster X-Y Recorder has been announced by the Bristol Company of Waterbury, Conn. The strip-chart recorder will automatically plot a continuous curve showing the relationship of one measured variable to another.

The recorder can be used in plotting temperatures versus pressure and speed versus torque in motor operation. Most other variables can also be handled.

The Dynamaster records on a 12-inch chart and is available in pen speeds of up to four-tenths seconds for full scale traverse to follow the most rapidly changing variables. Standard accuracy is .25 percent.

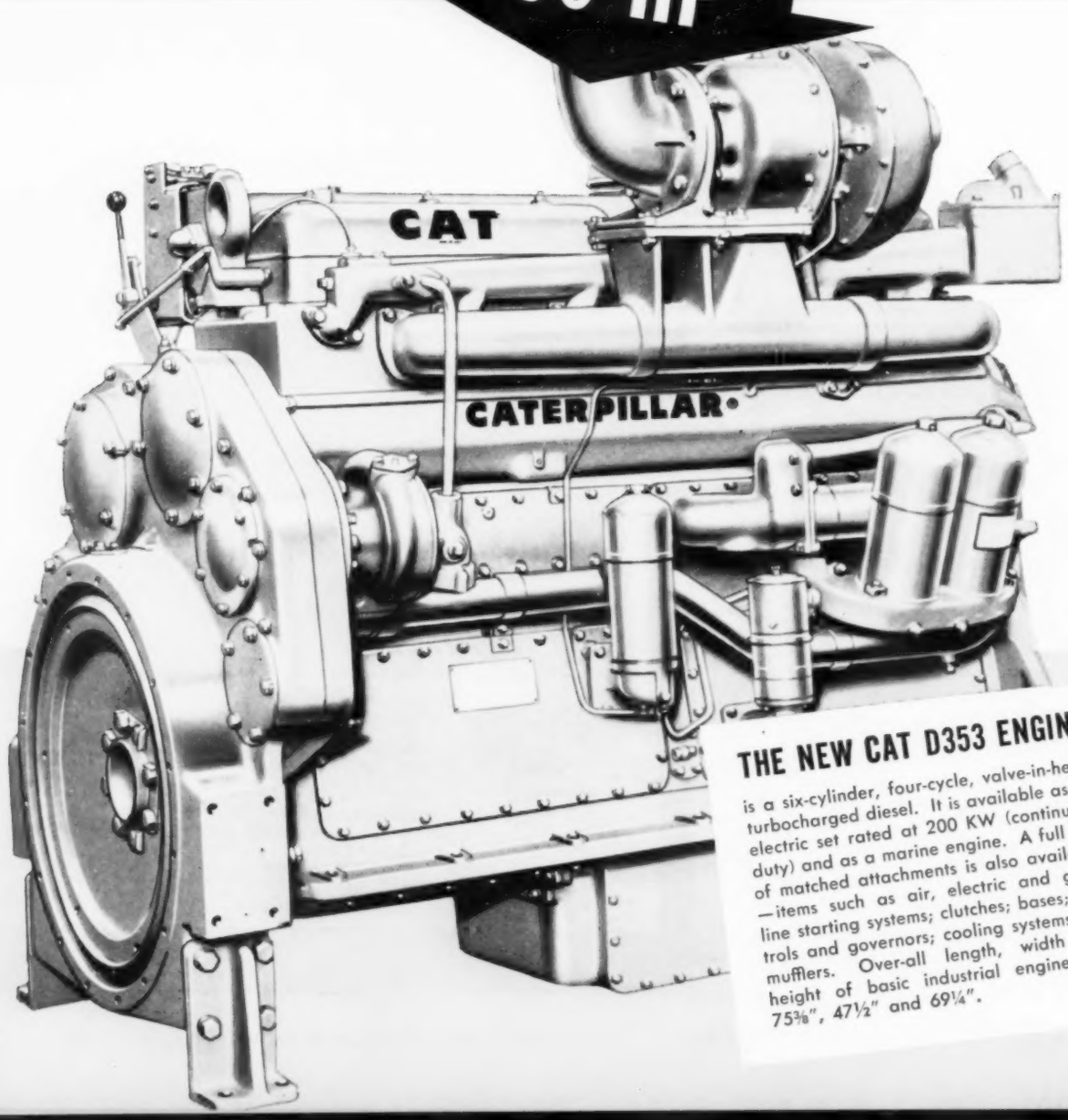
For more data, circle **No. E8** on Readers' Service Card, last page this issue.


FINE, QUALITY-CONTROLLED STEEL
GOES INTO ALL
LONE STAR LINE PIPE
Never-ceasing research, inspection and multiple testing to API specifications are your assurance of Lone Star's superb quality. Lone Star controls every step of manufacture from mining of ore to the finished product. LSS line pipe is fully normalized, of course.
Neighbor, wherever you are, specify Lone Star and we both get a good deal.
Lone Star STEEL
COMPANY
EXECUTIVE-SALES OFFICES
W. Mockingbird Lane at Roper • P. O. Box 12226 • Dallas, Texas
DISTRICT SALES OFFICES
Houston, Texas | Midland, Texas | San Antonio, Texas
Tulsa, Oklahoma | Wichita Falls, Texas | Shreveport, La.

Caterpillar announces in the world's most

The engine that delivered outstanding is now available as the D353 Industrial

D397 650 HP† | D375 430 HP† | **New D353 390 HP†** | D342 225 HP† | D339 140 HP†



THE NEW CAT D353 ENGINE

is a six-cylinder, four-cycle, valve-in-head turbocharged diesel. It is available as an electric set rated at 200 KW (continuous duty) and as a marine engine. A full line of matched attachments is also available —items such as air, electric and gasoline starting systems; clutches; bases; controls and governors; cooling systems and mufflers. Over-all length, width and height of basic industrial engine are: 75⅜", 47½" and 69¼".

another heavy-duty engine advanced line of diesels

performance in the famous D9 Tractor Engine, Electric Set and Marine Engine

D337	D326	D318 (SERIES G)	D315 (SERIES G)	D318	D315	D311
310 HP†	200 HP†	175 HP†	115 HP†	137 HP†	91 HP†	65 HP†

†Maximum output capacity

Adding to Caterpillar's line of modern heavy-duty engines, there's now the Turbocharged D353 rated at 390 HP (maximum output capacity). This engine, a prototype of the unit in the mighty D9 Tractor, is job-proved after thousands of hours of operation in the field!

Like all modern CAT* Diesels, the D353 incorporates in its design the advanced features developed by Caterpillar in a quarter century of diesel leadership. Compact and sturdy, it is built for the hard work. Its four-cycle design delivers the long, effective power stroke that puts power to more efficient use than other types of engines. Its turbocharger utilizes waste energy from the engine exhaust to increase over-all efficiency and economy. Its fuel system requires no adjustment. There are no cylinder ports to clean. And its exclusive Caterpillar single-orifice injection valves, combined with the precombustion chambers, permit the use of a wide range of fuels including premium diesel fuels as well as low-cost No. 2 furnace oil *without fouling*. All these and other features add up to performance that no unit in its power class can match.

With the addition of the D353 to the Caterpillar Engine line, you now have a wider choice than ever for your requirements. Engines are available up to 650 HP (maximum output capacity) and electric sets up to 350 KW (continuous duty). Either as original or replacement power, there's one among hundreds of different arrangements that exactly meets your needs. Leading manufacturers of machinery can supply these models in the equipment they build.

For complete information about the new D353 and other Cat Diesels, see your Caterpillar Dealer. Let him show you how diesel leadership based on a quarter century of experience can engineer the modern, heavy-duty diesels of tomorrow.

Caterpillar Tractor Co., Peoria, Illinois, U. S. A.

CATERPILLAR*

*Caterpillar and Cat are Registered Trademarks of Caterpillar Tractor Co.

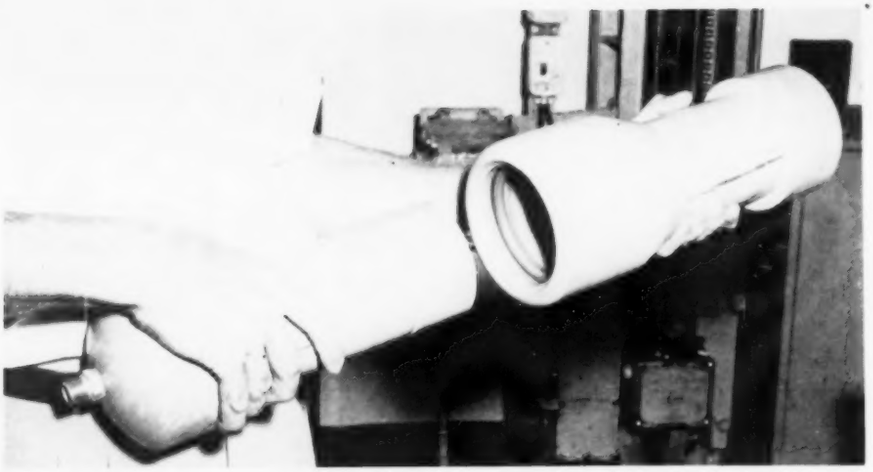
Caterpillar "Firsts" in a Quarter Century of Diesel Leadership

- "Hi-Electro" hardened cylinder liners
- Chemically conditioned cylinder liners
- Stainless-steel piston protectors
- Aluminum alloy bearings
- Interchangeable, adjustment-free fuel injection equipment
- Capsule-type injection valves
- Service meters
- Superior lubricants (detergent oils)
- Notarized, certified power

AND MANY MORE!

Certified Power for Cat Diesel Engines

Through the years, Caterpillar Engines have earned a reputation for *honestly rated power*. Now Caterpillar backs this reputation with a *notarized certificate* covering the horsepower capabilities of each engine. Caterpillar is the first and only manufacturer to give you this assurance of capacity. You have a right to demand *certified power* when you invest in an engine. You get it when you buy from your Caterpillar Dealer!



Quick Coupling

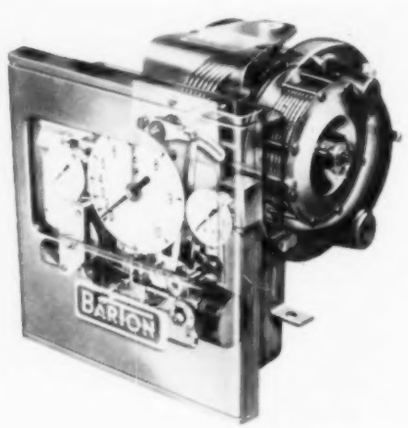
A "quick" coupling that can be assembled and disassembled in seconds has been developed from high impact Koroseal polyvinyl chloride pipe produced by the plastic division of B. F. Goodrich Industrial Products Co.

The new coupling is recommended for temporary chemical, oil, water or disposal lines. To install, one pushes the grooved end of the pipe into the coupling until the thrust ring seats in the groove. To disassemble, one sets a disassembly tool in place and simply pulls the pipe out of the coupling. It will take up to 10-degree misalignment in pipe joints. There are no exposed surfaces to protect in handling, no metal parts to rust or corrode and no bolts or snaps to tighten —or lose.

Quick coupling rigid pipe is available in 2-inch, 3-inch and 4-inch sizes in standard 20 and 30 feet lengths. B. F. Goodrich offers a variety of fitting adaptors, disassembly tools and replacement gaskets for easy use and maintenance in any installation.

Koroseal pipe is unaffected by most acids and alkalies as well as salt, oil, water and alcohol solutions and has found wide use in industry to handle chemicals that attack more expensive rubber, metal or alloy products.

For more data, circle **No. E9** on Readers' Service Card, last page this issue.



Pressure Controller

A new equipment item released by Barton Instrument Corporation of Monterey Park, Calif., the Model 237 Controller features the Barton Model 199 Rupture-proof bellows unit.

The controller is furnished in differential pressures ranges from 0-20 inch w.c. to 0-50 psi with static pressure ratings up to 6000 psi. A variety of housing materials are available including aluminum, steel, alloy steel and stainless steel.

Standard control actions include on-and-off, differential gap and proportional. Proportional plus reset or proportional plus rate are optional. The Model 237 utilizes a supply pressure of 20 psi and has an output of 3 to 15 psi with 6 to 30 psi optional.

For more data, circle **No. E10** on Readers' Service Card, last page this issue.

For precise pneumatic control operation . . .

Come to Kemp

Put an end to pneumatic control stoppages due to freezing, corrosion, and vapor locks. Install famous Kemp Oriad Dryers on your air lines to remove moisture and dirt. . .keep controls and delicate instruments operating smoothly and accurately.

Kemp Oriad Dryers on your lines cost surprisingly little. . . upkeep and maintenance costs are negligible. Rugged Kemp design keeps dryers operating perfectly, year after year.

Call your Kemp Representative or write us direct for Bulletins D-102 and D-103. The C. M. Kemp Mfg. Co., 405 E. Oliver St., Baltimore 2, Md.

KEMP OF BALTIMORE

Available in all sizes for automatic, semi-automatic, or manual operation. Steam or electric reactivation.

Natural Gas Pipeline Company of America Finds GAS LINE LIKE NEW AFTER 27 YEARS!

Bitumastic coal-tar enameled pipe to be re-used

In relocating its line to make way for a new highway near Truro, Iowa, the Natural Gas Pipeline Company of America removed some 900 feet of Bitumastic® enameled pipe laid in 1930. According to Mr. D. C. Allen, District Superintendent, this 24-inch seamless steel tubing is in such good condition that it will be reconditioned and used again as new pipe.

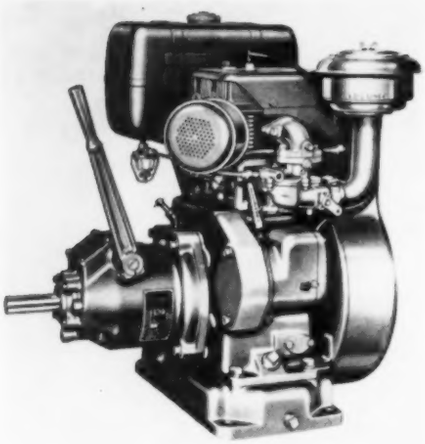
Applied by the rolling and "granny-rag" method in 1930, the Bitumastic XXH Enamel on this line was in excellent condition. The asbestos-felt overwrap, originally applied loose, was torn from soil stresses, but the Bitumastic enamel coating showed no serious disbonding or deterioration. At the time of relocation, the section had been under cathodic protection for two years. Natural Gas Pipeline Company of America records show no corrosion leaks on this section during the entire 27-year period underground.

Case histories such as this prove the unmatched protective ability of coal-tar enamel. In these days of rising material costs, you can't afford to gamble your entire pipeline investment on a less effective coating.

Your Koppers representative will be glad to give you full information on Bitumastic coal-tar enamels Koppers Company, Inc., Tar Products Division, Pittsburgh 19, Pa. District Offices: Boston, Chicago, Los Angeles, New York, and Woodward, Alabama. In Canada: Koppers Products, Ltd., Toronto and Edmonton.

KOPPERS

BITUMASTIC
REG. U. S. PAT. OFF.
PROTECTIVE COATINGS



Basic High Torque

Wisconsin Motor Corp. has announced a new four cycle single cylinder engine, Model AGN, rated at 12½ horsepower with a speed range from 1600 to 3200 revolutions per minute and with a piston displacement of 38.5 cubic inches.

The basic high torque of the Model AGN provides the load holding lugging power that resists rpm slowdowns under sudden shock loads, prevents stalling and permits a quick power recovery. It will be used as an equipment component on farm and construction machinery, railway maintenance-of-way equipment, oil field utility units, truck and trailer refrigeration units, larger rider-type power mowers and other types of equipment.

For more data, circle **No. E11** on Readers' Service Card, last page this issue.

Insulated Wiring

Type RHH wires for general-purpose wiring, insulated with silicone rubber and having an asbestos braid, have been announced by General Electric's wire and cable department.

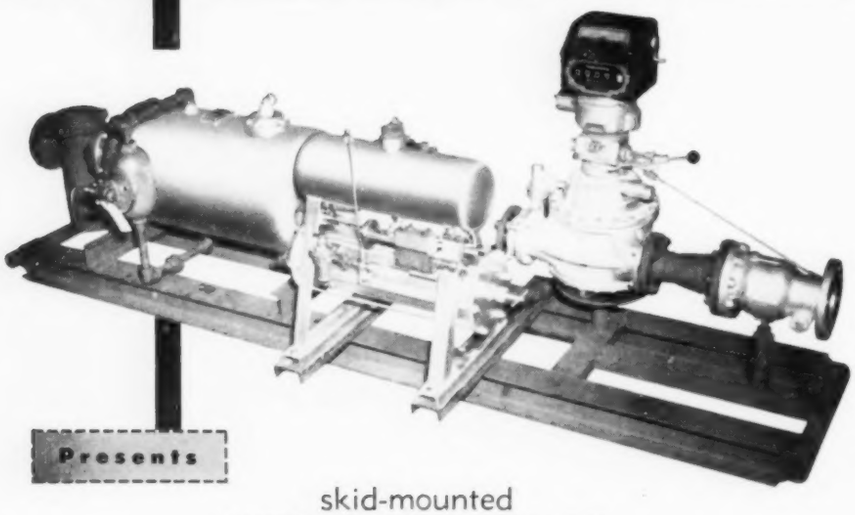
These wires, available in the same range of sizes as standard butyl-insulated Type RHH wires—No. 14 Awg through 6 Awg—are the first to be listed by Underwriter's Laboratories for general-purpose wiring. Until now, listing for silicone-insulated wires has been limited to fixture and appliance wires.

Because silicone insulation has greater resistance to heat, these wires, consequently, have longer life. The added heat resistance makes them especially suited to power and lighting installations in factories, railroad shops and yards, and in commercial buildings with boiler rooms or other heat-problem areas.

(This item supplements General Electric Company data on Pages 181-188 of the Composite Catalog, 1st Edition).

For more data, circle **No. E12** on Readers' Service Card, last page this issue.

MECO Integrated SERVICE



Presents

skid-mounted
AUTOMATIC CRUDE OIL
METERING ASSEMBLY
. . . with proportional sampler

Unit automatically shuts down after allowable has been flowed, with volume corrected to 60°F and registered on counter and/or ticket.

MECO sampler stores sample at line pressure.

Air and non-condensible gases are automatically separated from liquid and vented. Metering of gases is prevented.

Unit includes line-size strainer • SMITH line-size deaerator • float-operated pilot and safety shut-down valve • MECO proportional sampler • A. O. Smith positive displacement liquid meter • SMITH set stop valve.

MECO
MAINTENANCE
Mechanical CORPORATION
MAINTENANCE ENGINEERING CORPORATION
P. O. BOX 2437 3741 CLINTON DRIVE
PHONE CA 2-2351 HOUSTON 20, TEXAS

Crane

The County Commercial Cars Limited of Fleet, Hants, London, England, is the manufacturer of a new County/Boughton sideboom crane, designed especially for pipelaying.

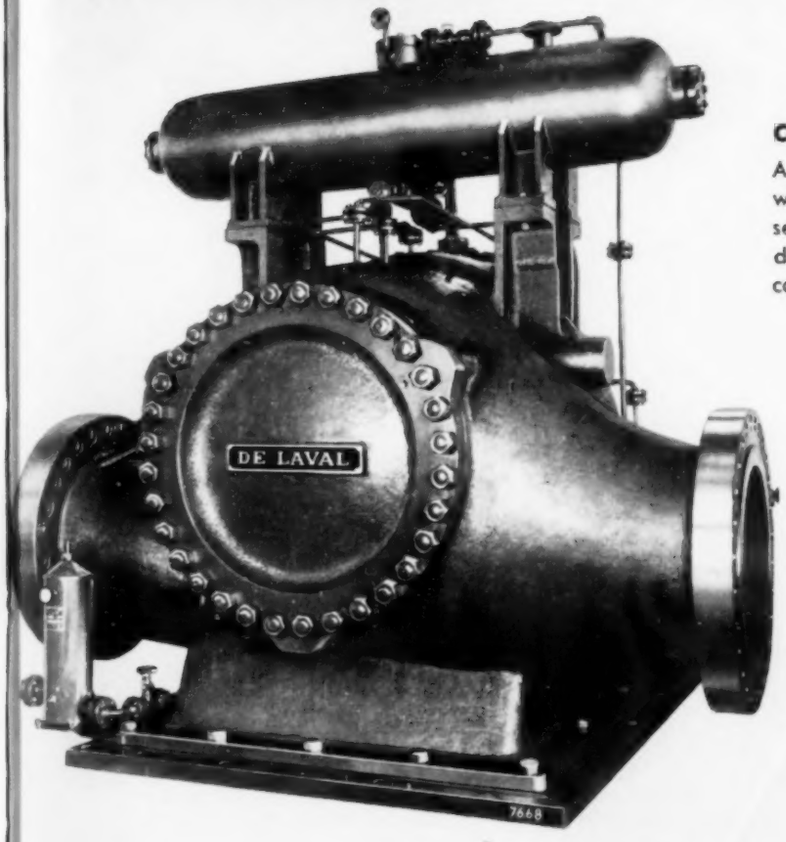
The crane features low ground pressure, ease of servicing and absolute maximum lifting capacity of five tons at four feet or two tons at ten feet jib reach. The jib length of 11 feet six inches gives operators maximum reach over a trench.

The sideboom mechanism is operated by its own friction clutch control which allows the hoist and luff motions to be made while the tractor is being driven.

For more data, circle **No. E13** on Readers' Service Card, last page this issue.

DE LAVAL
CENTRIFUGAL PIPELINE COMPRESSORS

come in two "packages" for easy installation



COMPRESSOR

A De Laval compressor with its emergency seal tank mounted directly on the compressor.

CONSOLE

The console contains the filters, motor-driven pumps, coolers, pressure switches, gauges and other accessories. It eliminates complicated piping on the packaged compressor . . . also serves as a protective cover for the equipment it houses.

Bulletin 503 gives data on De Laval centrifugal pipeline compressors. Write for your copy.

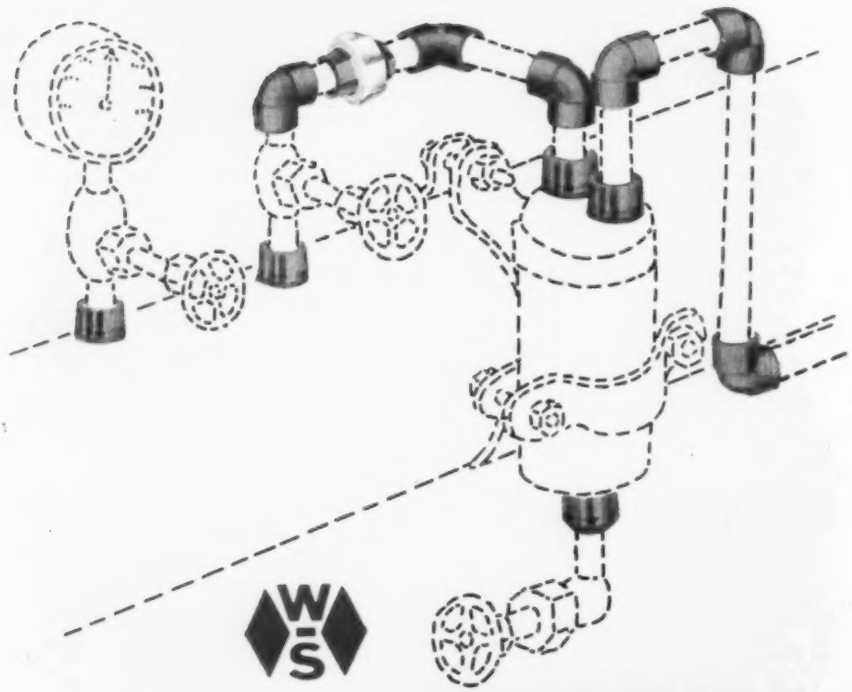
Designed in two packages, rugged De Laval centrifugal compressors offer many important engineering features. Among these are • high pressure contact shaft seal which eliminates gas leakage • heavy and rigid construction throughout • high load carrying capacity. The compressor and console arrangement makes De Laval centrifugal compressors easy to install—only simple low-cost foundations are required. De Laval units, totaling more than 280,000 horsepower, are now in operation on major pipelines.

DE LAVAL *Centrifugal Compressors*

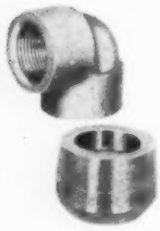
DE LAVAL STEAM TURBINE COMPANY
884 Nottingham Way, Trenton 2, New Jersey

DL-33

W-S Forged Steel Fittings...



Standouts in High Pressure Gas Lines



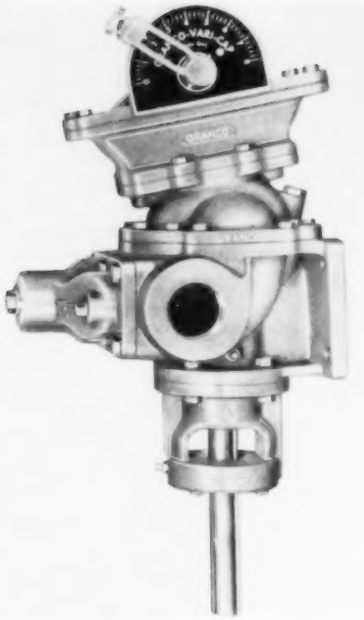
At the well . . . on gathering lines . . . on booster station piping . . . and in other high pressure gas lines, ⅛" to 4" in size, W-S Fittings protect piping systems against costly down time.

W-S Screw-end Fittings have smooth, precision machined threads, with extra long reinforcing bands extending well beyond the last thread. W-S Socket-Welding Fittings simplify installation of welding piping systems. Deep sockets help support and align the pipe for welding. Outside-the-pipe fillet weld means welding icicles can't form inside the pipe to obstruct flow.

For complete information on our complete line of forged steel fittings for high pressure service, send for Bulletin A-3. Write to W-S Fittings Division, H. K. Porter Company, Inc., P. O. Box 95, Roselle, N. J.

H. K. PORTER COMPANY, INC.

W-S FITTINGS DIVISION



Metering Pump

The new Granco Vari-Cap pump has been announced by Granberg Corporation of Oakland, Calif. Its name is derived from the fact that its capacity can be changed to suit the product being pumped by a simple dial setting. No slide rule calculations or gear changes are necessary. All that is required is a setting by dial to maintain the output capacity desired.

This new Granco metering pump can be ideally used for blending and processing operations, such as fuel, oils, caustics, additives and various other chemical products. The speed of the pump can be adjusted to handle products of varying viscosities. The operation can be powered from standard capacity motors and the differential taken up in the pump's adjustment. The range of adjustment is from zero to 40 gpm, at 500 rpm.

(This item supplements Granberg Corp. data on Page 178 of the Pipe Line Composite Catalog, 1st Edition.)

For more data, circle **No. E14** on Readers' Service Card, last page this issue.

Cycle Motors

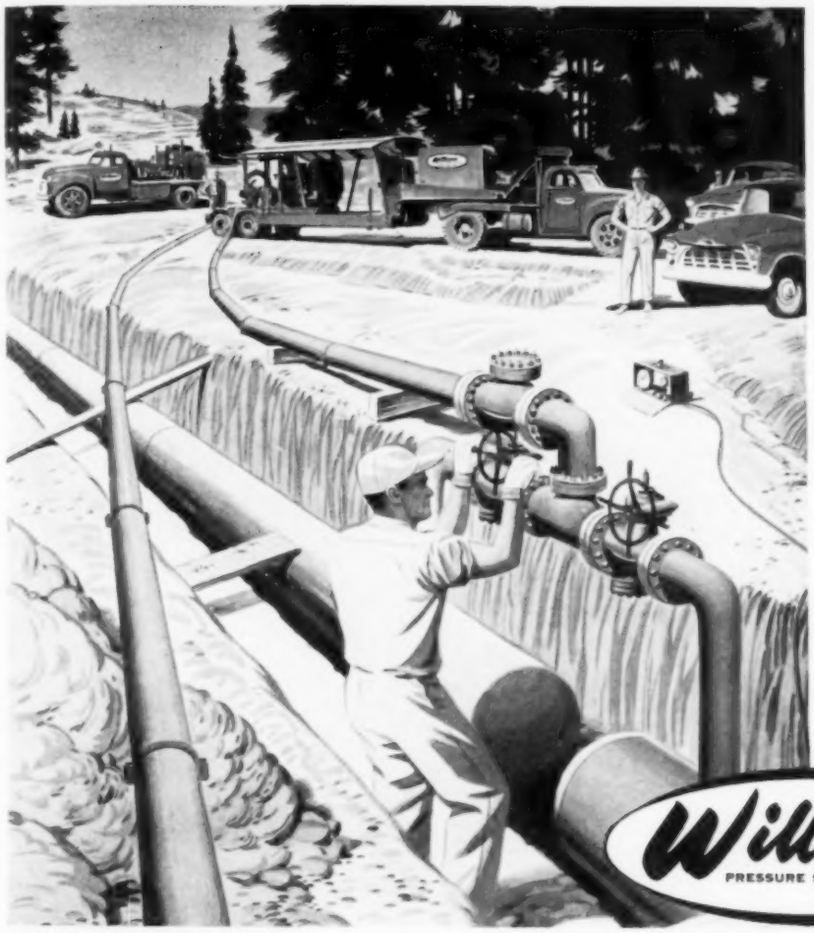
A new Form G severe-duty, single phase 60 and three phase 60/50 cycle motor line has been introduced by General Electric Company's General Purpose Motor department.

The new motors have been especially designed for applications where operating conditions are abnormal. Typical instances in this category include the powering of dairy and food processing equipment where motors are hosed down on a regular basis, and motor installations in the plating and mining industries which do not require the explosion-proof feature.

The new line features totally enclosed non-ventilated construction, base welded to stator shell, stainless steel shaft, cast-iron and shields and corrosion-resistant finish on both internal and external surfaces.

(This item supplements General Electric Company data on Pages 181-188 of the Pipe Line Composite Catalog, 1st Edition).

For more data, circle **No. E15** on Readers' Service Card, last page this issue.



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EXPERIENCED TESTING ENGINEERS

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PRESSURE SERVICE COMPANY

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SHREVEPORT, LOUISIANA

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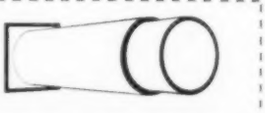


Railhead or in plant facilities apply coating rapidly, uniformly

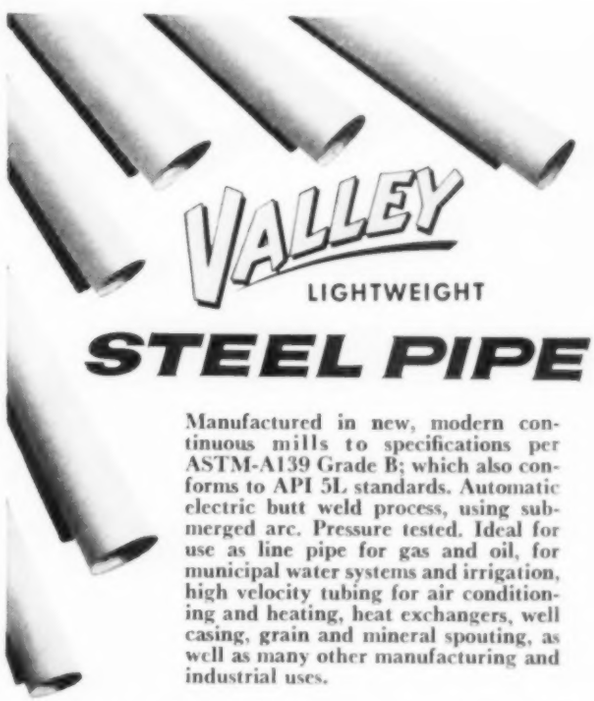
Somastic® Coated Pipe is your permanent protection against corrosion

Central or railhead plants are available to you for the application of Somastic® Pipe Coating. It is *thick*. It is *seamless*... no holidays because of overlapping layers, or bubbles. It is *re-inforced*, permanently. It is *rigid yet elastic*. And... it is proven under adverse soil conditions for more than 25 years. Why not coat your pipe *the better way?*

Write for full information TODAY!

Specializing in Pipe Protection Problems
• Tate and Centriline "In Place" Interior Cement Mortar Lining • "In Plant" and "Railhead" Centrifugal Spinning of Cement Mortar or Coal Tar Linings – Somastic® Exterior Coating • Pipe Wrapping • Reclamation: Removal of Old Wrapping, Straightening, Blasting, Beveling, Testing.

PIPE LININGS Inc.
2414 East 223 St. (P. O. Box 457)
Wilmington, California



VALLEY
LIGHTWEIGHT

STEEL PIPE

Manufactured in new, modern continuous mills to specifications per ASTM-A139 Grade B; which also conforms to API 5L standards. Automatic electric butt weld process, using submerged arc. Pressure tested. Ideal for use as line pipe for gas and oil, for municipal water systems and irrigation, high velocity tubing for air conditioning and heating, heat exchangers, well casing, grain and mineral spouting, as well as many other manufacturing and industrial uses.

Available in 6", 6⅝", 8", 8⅝", 10", 10¾" diameters, from 16 gauge up to and including .188 wall thickness; 20, 30 or 40-foot lengths; and in plain or belled ends. Quotations available for Victaulic or Dresser end processing, and coating.

Available for immediate delivery.

Write or call for full specification and production data to: **Steel Pipe Division**

VALLEY Manufacturing Company Valley, Nebraska

JUNE 17, 1957
Requisition No. 5047
TO
AMERICAN SAND-BANUM CO., Inc.
1100 Gals.
SABANOL
This Repeat Order (one of many) Is Further Evidence that
Instant Acting
SABANOL
THE HOMOGENIZING FUEL OIL TREATMENT
Imparts Maximum, Clean Burnability to ALL Grades of Fuel Oil.
Try a 5 Gal. Pail – Only $15.50
f.o.b. Freeport, N. Y.
SAND-BANUM
Pure Colloidal Concentrate
Removes and Prevents
Boiler Scale and Corrosion
Stocked by Leading Supply Houses
GULF COAST DISTRICT REPRESENTATIVES
Western Sand-Banum Company
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AMERICAN SAND-BANUM CO.
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MEADOW BROOK NATIONAL BANK BUILDING
FREEPORT, NEW YORK
SAND BANUM

New Equipment Literature

For more data on New Equipment or copies of Catalogs and Literature reviewed in this issue, use the Reader Service postcards just inside the back cover and facing the Advertisers Index. Simply circle code numbers of items desired—sign and mail card.

Chloride Pipe

A 12-page color catalog from Alpha Plastics, Inc., describes the regular and high impact corrosion-resistant rigid polyvinyl chloride pipe.

Included are tables of pipe sizes available, specific chemical applications, physical properties, temperature factors for various working pressures, support spacing and thermal expansion. Flow charts, installation instruments, pipe characteristics and fields of application are also included.

To get a copy, circle **No. E16** on Readers' Service Card, last page this issue.

Truck Tractors

An illustrated bulletin giving complete descriptions and photographs of the heavy duty truck tractors of Rotinoff Motors Ltd. Originally designed for military purposes, these units are [illegible] commercial applic[illegible] to haul [illegible] at s[illegible]

[illegible]

Corrosion Preventive

Kontol 77, internal pipe line corrosion preventive, is the subject of a six-page brochure issued by the Tretolite Company.

Basic facts such as what is Kontol 77, why Kontol 77 is effective and why Kontol 77 is necessary are discussed. Primary advantages that help pay for the cost of its use are also examined. Twenty pictures include reduced maintenance, freedom from product contamination, increased throughput, improved "C" factor and extended life for such auxiliary equipment as meters, valves, screens and pumps.

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[illegible], circle **No. E21** on Readers' [illegible]ast page this issue.

[illegible] Inc. has available a [illegible]ype A, AC, OV, UNI, [illegible]fugal Pumps developed [illegible]ure, high pressure and

[illegible]as also released two [illegible] bulletins.

[illegible]le **No. E22** on Readers' [illegible] page this issue.

[illegible]g

[illegible]wing 59 shortcuts to speed [illegible]omputation work has been [illegible]derick Post Co.

[illegible]cation emphasizes engineering [illegible] and shortcuts and shows new [illegible]es to old problems.

To get [illegible]et a copy, circle **No. E23** on Readers' Service Ca[illegible] [illegible]ervice Card, last page this issue.

TO REPAIR PIPE LEAKS
QUICKLY, PERMANENT
ANY PRESSURE — ANY TEMPERAT

SKINNER-SEAL EMERGENCY PIPE CLAMP for pinhole or corrosion leaks.

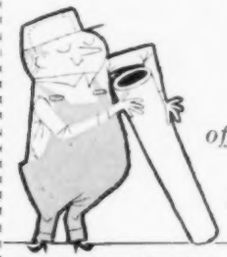
SKINNER-SEAL PIPE LINE CLAMP for long splits and bad corrosion leaks.

In stock—all supply stores

M. B. SKINNER COMPANY
SOUTH BEND 21, INDIANA, U. S. A.

NOTICE: Specify PELCO Welding Saddles
No change except the corporate name. We still have the same ownership, same management, same address, same telephone, and use the same 45 years of experience to render the same service under the same trade name—"PELCO."
PELICAN SUPPLY CO. INC.
P. O. Drawer 1108 Shreveport (84), La.
SEE YOUR NEAREST SUPPLY HOUSE

ON [redacted] PIPELINE, too, the Cleve- [redacted] been accepted [redacted] trencher...the [redacted] digs more [redacted] cheaper.



PIPE LININGS Inc.

offers you **"ONE SOURCE"** *for Dependable Pipe Line Protection & Reclamation*

Pick the Service You Need	In Our Plant	On Your Site	"In Place"	Pipe Sizes From	To
Cement Mortar Lining of Interiors — Tate Process	..	X	X	4"	16"
Cement Mortar Lining of Interiors — Centriline Process	..	X	X	16"	144"
Centrifugal Spinning of Cement Mortar Lining of Interiors	X	..	..	4"	30"
Centrifugal Spinning of Coal Tar Linings of Interiors	X	X	..	36"	144"
Somastic® Coating	X	X	..	½"	30"
Concrete Coating	X	..	..	4"	30"
Wrapping	X	X	..	4"	30"
Reclamation:					
Removal of Old Wrapping	X	X	..	2"	30"
Straightening	X	X	..	2"	30"
Blasting (Interior or Exterior)	X	X	..	2"	30"
Beveling	X	X	..	2"	30"
Roll Welding	X	X	..	2"	30"
Testing	X	X	..	2"	30"

write today for full information

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2414 East 223 St. (P.O. Box 457) • Wilmington, California

[redacted] chemical for treating

PARAFFIN

The money you make on reclaimed tank bottoms by using BRAKESOL will be substantially more than the cost of treating . . . including chemical and labor. Safe for use in production, pipeline and refinery equipment . . . Contains no chlorides, sulphides or other halides. BRAKESOL Treating Engineers have the experience and know-how to do a successful job. Contact them now!

Treating Engineers Available at These Locations

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Cormi, Illinois 7191
Casper, Wyo. 2-3453
Dallas, Texas DAvis 4-4884
Ft. Morgan, Colorado UNderhill 7-6389
Houston, Texas HOmestead 5-6648
Kilgore, Texas 3210
Lovington, N. M. 6-5954
New Ibera, Louisiana EMerson 9-3498
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Pampa, Texas MOhawk 9-9994
Edmonton, Alberta, Oklahoma City, Okla. VI 3-6629 WH 9-5561

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EXPORT DISTRIBUTOR: THE NATIONAL SUPPLY CO., EXPORT DIVISION

Hydraulic Torque Converter Drive
Weight — 78,250-lb tractor and side boom with full counterweight
127,000-lb lifting capacity at 4-ft overhang

Here the two HD-21's are lowering the heavy concrete-weighted pipe into a trench at the river bank. Outstanding stability of tractor plus quick, easy control of side boom and counterweights, permits booming out big loads smoothly, safely.

HD-21's handle the big lift on a Trans-Canadian river crossing

ALLIS-CHALMERS, CONSTRUCTION MACHINERY DEPARTMENT, MILWAUKEE 1, WISCONSIN

ALLIS-CHALMERS

Two Allis-Chalmers HD-21 tractors with Tractomotive side booms are handling the big lifts for Marine Pipeline and Dredging Ltd. on the Red River crossing for Trans-Canada Pipe Lines Ltd. The job involves handling 2,017 ft of 34-in. dia. concrete-weighted pipe weighing 1,200 lb per foot. The two HD-21's lift section by section of pipe and travel with it while a machine on the opposite bank pulls the pipe across the river.

Marine Pipeline President, Glen Kennedy, states, "These HD-21's not only lift the big loads, they can run with them, too. They've really got the capacity and balance to handle the heavy pipe."

The tractor-side boom units, together with other spread equipment, are working a 70-hour week on this job. Operators particularly like the way the HD-21 handles under heavy loads and the easy, positive control of the side boom.

Allis-Chalmers-Tractomotive offers three tractor side boom sizes to fit your pipe-line requirements. Choose the most modern pipe-line equipment available today — see your Allis-Chalmers construction machinery dealer.

TRACTOMOTIVE CORPORATION, DEERFIELD, ILLINOIS

TRACTOMOTIVE

JUNE 17, 1957
Requisition No. 5047
TO
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This Repeat Order (one of many) Is Further Evidence that
Instant Acting
SABANOL
THE HOMOGENIZING FUEL OIL TREATMENT
Imparts Maximum, Clean Burnability to ALL Grades of Fuel Oil.
Try a 5 Gal. Pail – Only $15.50
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Pure Colloidal Concentrate
Removes and Prevents
Boiler Scale and Corrosion
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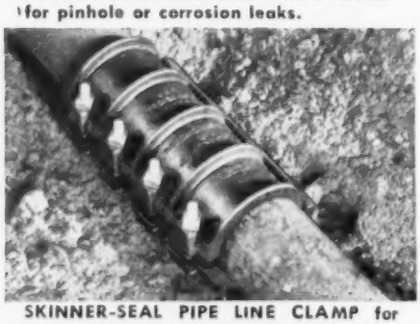
MEADOW BROOK NATIONAL BANK BUILDING
FREEPORT, NEW YORK
SAND BANUM

TO REPAIR PIPE LEAKS—
QUICKLY, PERMANENTLY
ANY PRESSURE — ANY TEMPERATURE

SKINNER-SEAL EMERGENCY PIPE CLAMP for pinhole or corrosion leaks.



SKINNER-SEAL PIPE LINE CLAMP for long splits and bad corrosion leaks.
In stock—all supply stores
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To get a copy, circle **No. E17** on Readers' Service Card, last page this issue.

Compressors

A technical bulletin on Centrifugal Compressors has been released by Cooper-Bessemer Corporation. The 24-page booklet gives engineering data and dimensions. Capacities range from 1000 to 100,000 cfm.

To get a copy, circle **No. E18** on Readers' Service Card, last page this issue.

Speed Reducers

Philadelphia Gear Works, Inc., announces the issuance of a new 40-page catalog on spiral-bevel speed reducers. The booklet contains design features, specifying and ordering information, selection tables, service factors and arrangements, dimensions,, horsepower ratings and parts lists.

To get a copy, circle **No. E19** on Readers' Service Card, last page this issue.

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The literature is an illustrated eight-page booklet which gives construction details and operating characteristics of Series HB Saunders valves. It also includes sizing data and a listing of flow co-efficients to aid in the selection of valves.

To get a copy, circle **No. E21** on Readers' Service Card, last page this issue.

Pumps

Pacific Pumps, Inc. has available a bulletin covering type A, AC, OV, UNI, multi-stage, Centrifugal Pumps developed for high temperature, high pressure and heavy services.

The company has also released two new process pump bulletins.

To get a copy, circle **No. E22** on Readers' Service Card, last page this issue.

Speed Drafting

A booklet showing 59 shortcuts to speed drafting and computation work has been issued by Frederick Post Co.

The publication emphasizes engineering techniques and shortcuts and shows new approaches to old problems.

To get a copy, circle **No. E23** on Readers' Service Card, last page this issue.

NOTICE: Specify PELCO Welding Saddles
No change except the corporate name. We still have the same ownership, same management, same address, same telephone, and use the same 45 years of experience to render the same service under the same trade name—"PELCO."
PELICAN SUPPLY CO. INC.
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ON FOUR CORNERS PIPELINE, too, the Cleveland 320 is showing why it has been accepted everywhere as the *modern* pipeline trencher...the trencher that fits more pipeline jobs—that digs more trench—in more soils—better, faster, cheaper.

Good Everywhere

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20100 ST. CLAIR AVENUE • CLEVELAND 17, OHIO

PIPE LININGS Inc.

offers you **"ONE SOURCE"** *for Dependable Pipe Line Protection & Reclamation*

Pick the Service You Need	In Our Plant	On Your Site	"In Place"	Pipe Sizes From	To
Cement Mortar Lining of Interiors—Tate Process	..	X	X	4"	16"
Cement Mortar Lining of Interiors—Centriline Process	..	X	X	16"	144"
Centrifugal Spinning of Cement Mortar Lining of Interiors	X	..	..	4"	30"
Centrifugal Spinning of Coal Tar Linings of Interiors	X	X	..	36"	144"
Somastic® Coating	X	X	..	½"	30"
Concrete Coating	X	..	..	4"	30"
Wrapping	X	X	..	4"	30"
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Testing	X	X	..	2"	30"

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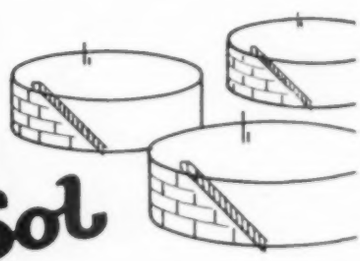
RECLAIM TANK BOTTOMS with BrakeSol



the most effective chemical for treating

PARAFFIN

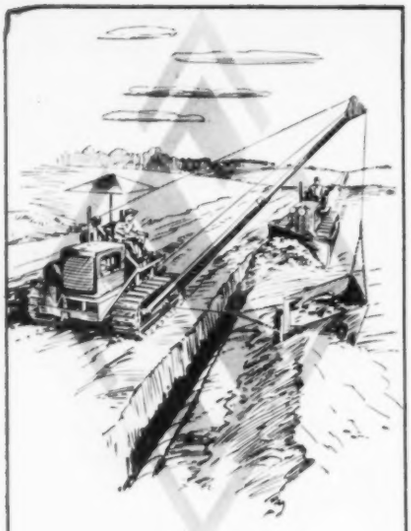
The money you make on reclaimed tank bottoms by using BRAKESOL will be substantially more than the cost of treating . . . including chemical and labor. Safe for use in production, pipeline and refinery equipment . . . Contains no chlorides, sulphides or other halides. BRAKESOL Treating Engineers have the experience and know-how to do a successful job. Contact them now!

Treating Engineers Available at These Locations

Ardmore, Okla. 6489
Carmi, Illinois 7191
Casper, Wyo. 2-3453
Dallas, Texas DAvis 4-4884
Ft. Morgan, Colorado UNderhill 7-6389
Houston, Texas HOmestead 5-6648
Kilgore, Texas 3210
Lovington, N. M. 6-5954
New Iberia, Louisiana EMerson 9-3498
Odessa, Texas EMerson 6-4511
Pampa, Texas MOhawk 9-9994
Edmonton, Alberta, Oklahoma City, Okla. VI 3-6629 WH 9-5561

BrakeSol INC.

P. O. BOX 9506 • OKLAHOMA CITY, OKLA.
EXPORT DISTRIBUTOR: THE NATIONAL SUPPLY CO., EXPORT DIVISION



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SOMERVILLE.

combines quality with efficiency to give the best possible value.

SOMERVILLE CONSTRUCTION CO.

Ada, Michigan

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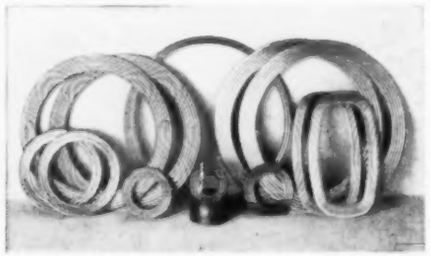
TRANSMISSION LINES | DISTRIBUTION SYSTEMS

Need Plain or Jacketed CORRUGATED METAL GASKETS?



Call CHICAGO-WILCOX for PROMPT ATTENTION

Chicago-Wilcox understands the gasket requirements of refineries and is equipped to supply all types of gaskets, including plain or jacketed corrugated metal gaskets like these. Made of ingot iron, aluminum, stainless steel, copper, brass, nickel, and monel in all sizes and shapes.

Send specifications for quotations and prompt-delivery schedule.

CHICAGO-WILCOX MFG. CO.

7709 Avalon Avenue, Chicago 19, Ill.
Phone: SAginaw 1-1900

Advertisers' Index

• Dot preceding name of advertiser indicates that detailed data on products and services of the firm will be found in current 1st (1957-58) edition of The Pipe Line Composite Catalog.

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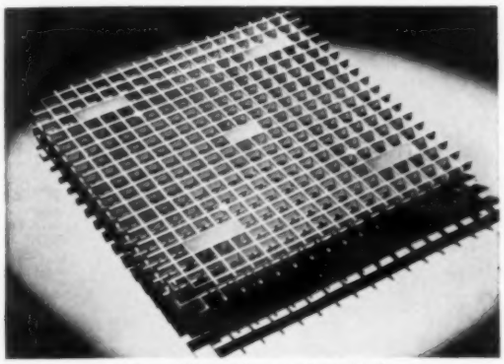
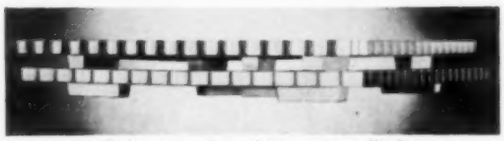
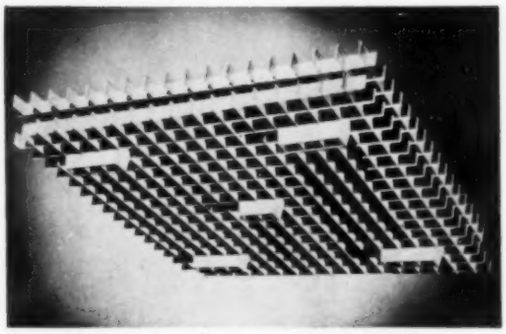


Overall top view as installed



Side view of packing as installed



Bottom view showing spacing supports

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To increase the throughput of your existing counterflow induced draft cooling tower, Fluor Products Company now offers "Poly-Grid" packing.

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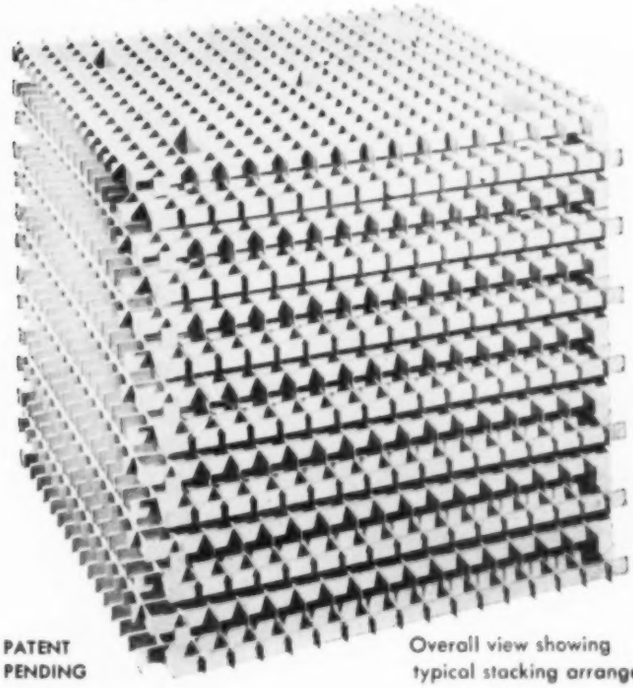
"Poly-Grid" is available in high impact polystyrene or linear-polyethylene to meet all water conditions.

Fluor "Poly-Grid" packing allows you to cool more water under existing operating conditions, or to realize extra cooling of present throughput — all at minimum capital expenditure.



PATENT PENDING

Overall view showing typical stacking arrangement

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POLY-GRID can be easily installed in any counterflow induced draft cooling tower—regardless of make or model!

Call him today!

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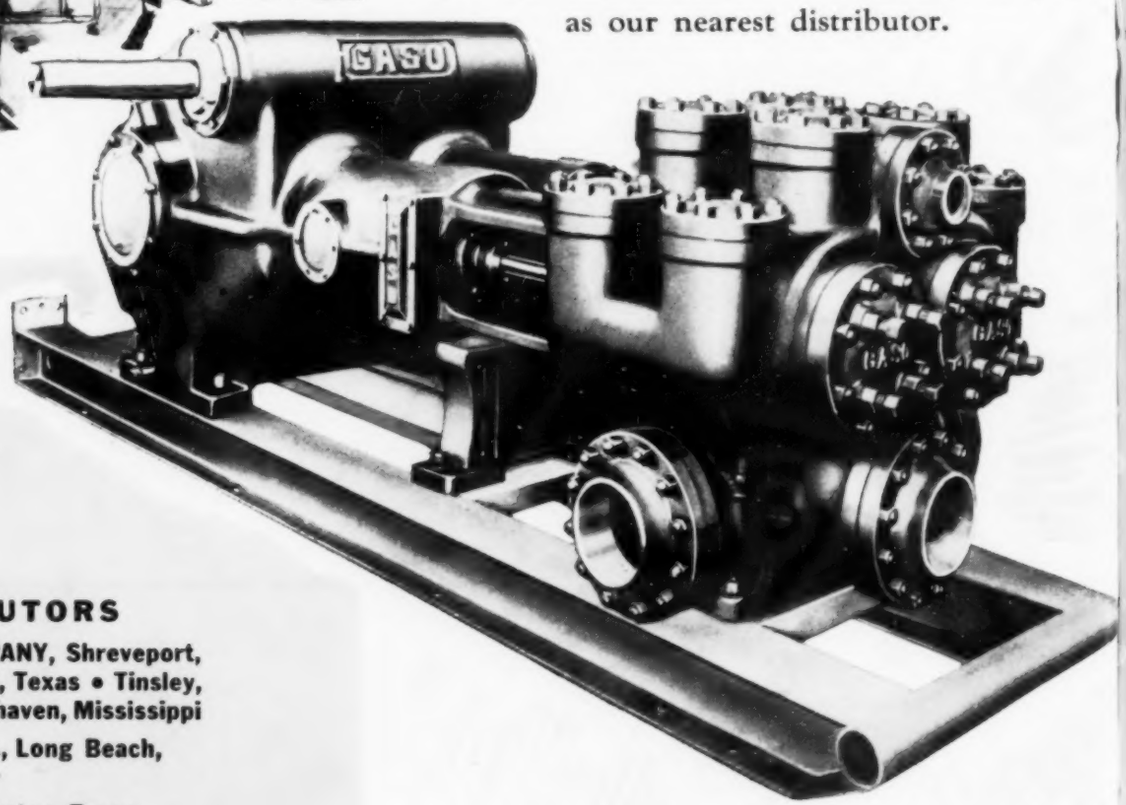

Fig. 2651-2652 — Gaso 12" stroke Duplex Piston Power Pump. Largest of Gaso models designed to pump oil or water through long lines at pressures from 475 to 1500 psi.

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